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# *Proceedings in Finance and Risk Perspectives ‘14*

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# **VOLUNTARY RISK MANAGEMENT DISCLOSURE AND FIRM VALUE: EVIDENCE FROM MALAYSIAN LISTED COMPANIES**

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**Abstract.** *The objective of this study is to examine the relationship between Voluntary Risk Management Disclosure (VRMD) and Firm Value (FV). Empirical evidence on the association between VRMD and FV is still not yet established. Based on a sample of 395 firms listed on the main market of Bursa Malaysia in year 2011, this study uses univariate and multivariate statistical tests and found that VRMD has a positive and significant relationship with FV. Even though we hypothesize that Damaging Voluntary Risk Management Disclosure (DVRMD) will have a negative association with FV, however our findings tend to suggest otherwise. Our univariate analysis shows that DVRMD has a positive and significant relationship with FV, while the multivariate analysis shows no significant relationship between DVRMD and FV. We also test the relationship between Beneficial Voluntary Risk Management Disclosure (BVRMD) and FV. As expected, our univariate and multivariate analysis show that there is positive significant relationship between BVRMD and FV. Our results tend to suggest that VRMD is relevant to the investors in their investment decision-making. Our findings provide evidence that should be of interest especially to firms in terms of deciding upon whether to provide or avoid disclosing voluntary risk management information to their stakeholders.*

**Keywords:** *Risk Management, Voluntary Disclosure, Firm Value, Risk Reporting, Risk Management Disclosure*

## **Introduction**

Lately, firms in all industries are expected to be more exposed to non-financial risks than financial risk alone (Ernst & Young 2010; 2011 & 2013). Due to the increase in challenges and uncertainties in business environments, non-financial risks are expected to continuously remain as the main risk faced by all firms in the future (Ernst & Young 2013). Nevertheless, the disclosure of non-financial risks management information is still voluntary in many countries in the world. In Malaysia, only the financial risk management information is a mandatory disclosure through among others, the enforcement of the Malaysian Financial Reporting Standard (MFRS) 7 *Financial Instruments: Disclosure*.

## VOLUNTARY RISK MANAGEMENT DISCLOSURE AND FIRM VALUE: EVIDENCE FROM MALAYSIAN LISTED COMPANIES

Since the non-financial risk management information is still a voluntary disclosure, prior literature found that the disclosure of this information in annual reports tend to be low (Linsley & Shrivs 2007; Abraham & Cox 2007; Azlan et al. 2009; Ismail & Abdul Rahman 2011). The low disclosure provides an increase challenge to investors to identify key risk drivers faced by firms. It can be an even greater challenge for investors to identify the key risk factors when these firms have complex business model or undertake complex and diverse transactions.

To date, the regulatory bodies in Malaysia that issued guidance such as the Malaysian Code on Corporate Governance (MCCG) (2012) as well as the Recommended Practice Guide 5 (Revised) issued by the Malaysian Institute of Accountants (MIA) require firms to disclose only general information about the framework and policies of non-financial risk management in firms' annual reports. However, the Financial Reporting Council (FRC) (2011) in the United Kingdom found that investors actually ask for more strategic information about non-financial risks. Investors actually need information about the type of risks faced by firms and how these risks are being managed by the firms (FRC 2011). This information is expected to be very important for investors in their investment decision making (Linsley & Shrivs 2006; Beretta & Bozzolan 2004; Cabedo & Tirado 2004; Solomon et al., 2000; Lungu et al. 2009/2010).

Nonetheless, FRC (2011) also found that firms refuse to disclose specific information about risks as they claim that this information would be commercially sensitive information. There is a general wariness about disclosing risks information because it might have a negative impact on the firm (FRC 2011). Furthermore, firms would not have an incentive to report sensitive information if they are not sure about the reaction of investors when they disclose the information (Suijs 2007). Therefore, this study is conducted to investigate empirically the effect of disclosure of non-financial risk management on firm value. Even though the demand for voluntary risk management disclosure seems to increase, however there is lack evidence on whether the demand meets the need of investors in terms of decision on firm value.

This paper proceeds with section two discussing relevant literature related to risks management disclosure and firm value. Section three will discuss the theory utilized in this study and hypothesis development. Section four will present methodology adopted in this study. Section five will present and discuss findings of this study. Finally section six will conclude this paper.

### Literature Review

The Efficient Market Hypothesis generally suggests that a firm's value should reflect all available information reported to the public (Ohlson, 1995; Feltham & Ohlson, 1995). As such, firms may have incentives to disclose more information voluntarily to increase the confidence of stakeholders, particularly investors, on the performance and prospects of the firm (Core, 2001). Previous studies have empirically demonstrated that voluntary disclosure could positively influence firm value (such as Amir & Lev 1996; Al-Akra & Ali 2012; Uyar & Kilic 2012; Gamerschlag 2012; Oliveira et al. 2010; Anam et al. 2011; Vafaei et al. 2011).

Amir and Lev (1996) found that when financial information is combined with non-financial information, they demonstrate a positive relationship with firm value among US firms. This suggests that non-financial information which is generally voluntary in nature is relevant to investors and also a complementary information to financial information. Al-Akra and Ali (2012) examined the effect of more than 80 items of voluntary disclosure on the value of

Jordanian's firms. Voluntary disclosure in their study include background information of firm, information about directors, capital market data, product and service information, employee information, and research information. Al-Akra and Ali (2012) found that voluntary disclosure has a positive relationship with firm value. Uyar and Kilic (2012) investigate the effect of 96 items of information voluntarily disclosed by 129 Turkish firms and also found a positive significant relationship with firm value.

In the context of voluntary risk management disclosure (VRMD), previous research has not yet reached a consensus regarding the relationship between VRMD and firm value (FV). Ismail et al. (2012) examined the relationship of risk management voluntary disclosure information with firm value in Malaysia from data years 2006 and 2009. The voluntary risk management disclosure was measured using two methods. The first was based on the "quantity" of information measured by the number of words disclosed associated with risk. Second was the "quality" of information measured by the number of words disclosed related to risk which contained information about time orientation, measurement type and economic sign. Ismail et al. (2012) found that the quantity of disclosure of risk management has a significant positive relationship with firm value in 2006 ( $p < 0.05$ ) but not significant in 2009. While in the case of the quality of risk management disclosure, it was found to have a negative relationship with firm value in 2009 ( $p < 0.05$ ), but not significant in 2006.

Ismail et al. (2012) encode the voluntary risk management disclosure based on the number of words which is considered to be not appropriate because words may not contain any meaning without referring to the context of the sentence (Milne & Adler, 1999). In using only keywords to represent information regarding risk management, Ismail et al. (2012) may have overlooked some important issues about the risk management information. Mihkiinen (2013) studied the impact of the disclosure of non-financial risk management information and financial risk management information on the information asymmetry in the Finnish firms. The study found that the disclosure of non-financial and financial risk management information had a positive impact on the information asymmetry. It is expected that the lower the information asymmetry the lower would be the investment risk faced by investors (Healy & Palepu, 2001). This in turn may increase the value of the firm (Gordon et al., 2010).

However, lower information asymmetry may not necessarily result in better firm value especially in the case of risk management disclosure. Lower information asymmetry of risk management disclosure could potentially be harmful to the firm which may affect firm value. Financial Reporting Council-FRC reported that firm representatives believed risk information is actually commercially sensitive information and if it is disclosed, it may negatively affect the firms (FRC 2011). This may be due to the fact that as more such information is released, the more investors are aware of the firm's risk factors (Linsley & Shrives, 2006). Therefore, voluntary disclosure of risk management information in reality may be presumed to have a negative effect on firm value (FRC, 2011; Dobler, 2008). However since there is lack empirical evidence on the effect of voluntary risk management disclosure on firm value, hence this study is conducted to further fill up that gap.

## Theory and Hypothesis Development

Earlier studies generally utilize signaling theory to explain why firms disclose voluntary information to stakeholders (Uyar & Kilic, 2012; Anam et al., 2011; Sheu et al. 2010). Based on the signaling theory, a firm is believed to disclose comprehensive information to signal good news to investors (Oliveira et al., 2006). Additionally, high-performing firms also have incentive to disclose more information to investors to signal that the firm has better performance than other firms (Wallace & Naser, 1995; Mavlanova et al., 2012). Therefore, based on signaling theory, we argue that a firm has an incentive to voluntarily disclose more information to investors regarding risk management in order to inform investors that the firm has a good risk management system and to signal that the firm is able to protect and create value for the investors (Beasley et al., 2005). Subsequently it is expected that this may increase the confidence of investors in their investment decisions.

Prior studies generally found positive association between voluntary disclosure and firm value (Amir & Lev 1996; Al-Akra & Ali 2012; Uyar & Kilic 2012; Orens et al. 2009; Gamerschlag 2012; Oliveira et al. 2010; Anam et al. 2011; Vafaei et al. 2011). In the case of voluntary risk management disclosure, latent studies tend to find positive significant association with the concept of firm value (see Ismail et al., 2012; Mihkiinen, 2013). However, there are scholars argue on the potential harmful effect of voluntary risk management disclosure on firm value (FRC, 2011; Dobler, 2008). In the lack of consensus whether the effect of voluntary risk management disclosure on firm value could be positive or negative, we proposed our first hypothesis as follows:

*H1: Voluntary risk management disclosure (VRMD) has a significant relationship with firm value (FV).*

As discussed earlier, voluntary risk management disclosure may not necessarily provide negative information to stakeholders. The idea of providing voluntary information to firms' stakeholders is to reduce information asymmetry between those with knowledge about the firms (specifically firms' management) with those having lack of knowledge about the firms (specifically stakeholders). Voluntary risk management information could assist investors to be clearer about firms' potential risks and potential prospects when they want to rationalize on their investments decision making (Linsley & Shrives 2006; Beretta & Bozzolan 2004; Cabedo & Tirado 2004; Solomon et al., 2000; Lungu et al. 2009/2010). If firms could disclose clearly the difference between beneficial and damaging voluntary risk management information, it is expected that investors would be able to come up with a much better decision making related to the firms' risk management issue.

Linsley and Shrives (2006) found that firms tend to disclose more beneficial (good news) than damaging (bad news) information regarding risk management. Dobler (2008) stated that a firm will avoid disclosure of damaging information due to concerns about adverse consequences to both future value and cash flow. Since beneficial information is expected to assist investors better in terms of their decision making regarding firms' future performance, we proposed a positive relationship between beneficial voluntary risk management disclosure and firm value. On the other hand, since damaging voluntary risk management disclosure is expected to make investors avoid investing in the firms, we proposed a negative relationship between damaging voluntary risk management disclosure and firm value. Therefore, our second hypothesis is broken down into two and stated as follows:

*H2a: Beneficial voluntary risk management disclosure (BVRMD) has a positive relationship with firm value.*

*H2b: Damaging voluntary risk management disclosure (DVRMD) has a negative relationship with firm value.*

## Methodology

### *Sample Selection*

The sample in this study is 395 non-financial firms listed on the Main Market of Bursa Malaysia in year 2011. We exclude financial firms as they are in reality risk management entities and can be expected to make significantly different types of risk disclosure (Linsley & Shrives, 2006). Table 1 list the type of industry in our sample firms.

Table 1: Sample

Industry Type	Number of Firms
Construction	23
Consumer Products	67
Hotels	4
Industrial Products	126
IPC	4
Mining	0
Plantations	20
Properties	44
Technology	16
Trade/Services	91
Total	395

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## Measurement of Variables and Data Collection Methods

### *Dependent Variable: Firm Value*

This study utilize three measurements for Firm Value, that is, Market Capitalization (MCAP); Tobin's Q (TOBIN) and Ratio of Market to Book Value (MTBR). Many prior studies have used share price to measure the value of a firm (including Chakhovich, 2013; Vafaei et al., 2011; Gamerschlag, 2010; Oliveira, 2010; Core et al., 2002). However, market capitalization (MCAP) has been said to be more accurate in measuring the value of the firm. It is because MCAP takes into account the market value of the firm as a whole, while share price only measures the value of the firm based only on the price of one share (Uyar & Kilic, 2012; Anam et al., 2011). MCAP is calculated by multiplying firms' outstanding shares with per share market price.

Prior studies also uses Tobin's Q (TOBIN) as another measurement for firm value (Chen et al., 2013; Chan, et al. 2011; Chi et al., 2009). TOBIN measures the ratio of market value and the replacement value of the assets of the firm. A lower ratio value (between 0 and 1) means that the cost to replace the firm's assets is greater than the value of its shares. This means that the firm's shares are undervalued. On the other hand, the ratio greater than 1 indicates that the firm's shares are more expensive than the replacement cost of assets, implying that the shares is overvalued. Tobin's Q is measured based on the market value of equity plus the book value of liabilities, divided by the book value of total assets (Pathan & Faff, 2013; Orens et al., 2009; Chi et al., 2009; Baek et al., 2004).

In addition, the ratio of the market value of equity to book value of equity (MTBR) may also indicate whether the firm's market value is over or undervalued compared to the book value of its equity. Prior studies, such as Al-Akra and Ali (2012) and Hassan et al. (2009), have used the natural logarithm of MTBR as a measure of a firm's value. This study measure market value of equity by multiplying the number of outstanding shares with the share price six months after the end of the accounting year (Al-Akra & Ali, 2012; Hassan et al., 2009). Hassan et al. (2009) stated that firm's share price six months after the end of the accounting year could ensure that the price has captured all accounting information revealed in companies' annual reports. While the book value of equity is taken at the end of the accounting year.

### *Independent Variable of Interest: Voluntary Risk Management Disclosure (VRMD)*

Similar to Linsley and Shrives (2006), we used content analysis method to collect the data of VRMD. Data was collected from 3 sections of the narrative parts of the Annual Report namely Chairman's Statement (CS), Operations Review (OR) and Management Discussion and Analysis (MDA) (Linsley & Shrives, 2006; Beretta & Bozzolan, 2004; Azlan et al., 2009). This study uses the "sentence" for the text encoding unit. Past studies such as Abraham and Cox (2007); Linsley and Shrives (2006); and Azlan et al. (2009) also used the "sentence" as the coding unit in their study, as "sentence" unit is believed to be more reliable than other units of analysis (Milne & Adler, 1999). This study adopted the encoding procedure by Linsley and Shrives (2006) and modified according to the suggestions of FRC (2011). Further detail on the encoding procedure is described in Appendix A and B.

Prior to the commencement of the content analysis, 2 coders encode the same Annual Report and an inter coder reliability analysis using the Kappa statistic was performed to

determine the reliability and consistency among coders. The inter coder reliability and consistency for the coders was found to be Kappa = 0.762 (p<0.001). According to Landis and Koch (1977), values of Kappa higher than 0.7 reflect a suitable level of agreement. Table 2 illustrates the example of VRMD that has been coded.

Table 2: Examples of Voluntary Risk Management Disclosure Encoding

Risk Category	Sentence	Annual Report Location	Score
Operational Risk	<b>Beneficial Risk:</b> “However, to a certain extent, <u>Malaysia benefited from the situations in Japan and Thailand as the disruption in the supply chain had caused the shortfall to be channeled to the component manufacturers located here.</u> ”  Tomei Consolidated Berhad (2011)	Chairman’s Statement;  pg.12	1
	<b>Damaging Risk:</b> “ <u>Higher labour costs were incurred by our Group to retain our plantation workers and this has consequently impacted our CPO production cost.</u> ”  Hap Seng Plantations Holdings Bhd. (2011)	Chairman’s Statement; pg.18	1
Strategic Risk	<b>Beneficial Risk:</b> “ <u>Global spending on medicines is projected to hit US\$1.1 trillion (RM3.07 trillion) by 2015, and this is an indication of the vast potential opportunities that awaits the Firm.</u> ”  CCM Duopharma Biotech Bhd. (2011)	Chairman’s Statement; pg.7	1
	<b>Damaging Risk:</b> “ <u>Financial conditions have deteriorated, growth prospects have dimmed, and downside risks have escalated.</u> ”  HeiTechPaduBerhad (2011)	Review of Operations;  pg. 94	1
Empowerment Risk	<b>Beneficial Risk:</b> “To face this challenge, we have <u>intensified our driver recruitment efforts as well as offering competitive remuneration</u> ”	Chairman’s Statement;	1

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package for our drivers.”

pg. 8

KBES Berhad (2011)

## **Damaging Risk:**

“..the management has outsourced its entire oil palm plantation and mill operation to a reliable operator to achieve less time, less human effort, higher operation efficiencies and a highly flexible organization structure.”

Chairman’s  
Statement;  
pg. 10

1

Malpac Holdings (2011)

Explanation: Although the above sentence describes the benefits of outsourcing, Malpac Holdings Bhd was at that time experiencing problems with its chosen operator, causing legal action (see Malpac Holdings Annual Report (2011: page 10). Malpac Holdings has also experienced operational difficulties due to pending litigation with the operators.

## **In the Annual Report of Malpac Holdings Bhd (2011: page 11) the following is stated:**

*“Due to the ongoing legal disputes between the Group and the appointed operator, the Group was stuck operationally especially in improvement of the existing operations, replanting of old palms, and did not have full access to production record to analyze and review the plantation operation key performance indicators in year 2011.”*

Based on the sentence above, the firm’s *outsourcing* strategy is anticipated to cause Damaging Risk in the future.

## **Integrity Risk**

### **Beneficial Risk:**

“WCT Berhad was named the Top 15 firms in Malaysia Investor Relations Awards under the Medium Capitalisation category.”

Chairman’s  
Statement;  
pg. 21

1

WCT Berhad (2011)

### **Damaging Risk:**

“The firm is currently bogged down by a few litigation cases and dispute with the minority shareholder which affected its operations.”

Executive  
Director’s Review  
of operations;

1

Taliworks Corporation Berhad (2011) pg. 22

**Technology  
and  
information  
processing  
risk**

**Beneficial Risk:**

“Pelikan Group established several online portals for internal and external communication with our stakeholders to maintain constant dialogue and flow of information.”

Group Operations 1  
Review;  
pg. 34

Pelikan International Corporation Berhad (2011)

**Damaging Risk:**

“Many will be aware from the announcements by the Firm that this year was marred by the recent discovery of financial irregularities that have cast severe doubts on the accuracy and reliability of the financial reporting of the Group, and which have led to some of the Firm’s subsidiaries defaulting in their respective loan repayments and the Firm being classified as an affected listed issuer under Practice Note 17 of the Main Market Listing Requirements of Bursa Malaysia Securities Berhad.”

Chairman’s 1  
Statement;  
pg. 4

Silver Bird Group Berhad (2011)

*Multivariate Model*

Based on previous studies, control variables used in this study include firm size (SIZE), leverage (LEV), profit (PROFIT) and growth (GROWTH) (Uyar & Kilic 2012; Anam et al. 2011; Al-Akra & Ali 2012; Hassan et al. 2009; Orens et al., 2009). Past studies control firm’s size because large firms often disclose more information to investors (Gul & Leung, 2004; Eng & Mak, 2003) and this will facilitate large-sized firms to get investment. Therefore large firms tend to have a much higher value than small firms (Al-Akra & Ali 2012; Hassan et al., 2009). Prior literature also found that leverage usually has a negative and significant relationship with firm value because leverage serves as a proxy for financial risk (Orens et al., 2009; Klein et al., 2005; Chen et al., 2006).

In terms of profits, previous studies found profit has a positive and significant relationship with firm value because firms with high profits tend to have high performance and prospects, as well as being less risky (Orens et al. 2009; Chen et al., 2006). In the case of growth, firms with higher growth would indicates that they have good prospects in the future (Hassan et al. 2009; Al-Akra & Ali, 2012). Hence, a positive relationship between growth and firm value is expected. Therefore based on previous studies, the multivariate model in this study is as follows:

$$FV_i = \beta_0 + \beta_1 VRMD_i + \beta_2 SIZE_i + \beta_3 LEV_i + \beta_4 PROFIT_i + \beta_5 PROFIT_{i-1} + \beta_6 GROWTH_i + \varepsilon$$

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Where:

FV = Firm Value [proxy by Market Capitalization (MCAP), Tobin's Q (TOBIN) and Ratio of Market-to-book value (MTBR)]

VRMD = Voluntary Risk Management Disclosure

SIZE = Natural logarithm of total assets (Uyar & Kilic, 2012; Chen et al., 2013)

LEV = Total liability / total assets (Uyar & Kilic, 2012; Baek et al., 2004)

PROFIT = Net profit (Uyar & Kilic, 2012; Anam et al., 2011; Orens et al., 2009)

GROWTH = Current sales / previous year's sales (Uyar & Kilic, 2012; Al-Akra & Ali, 2012)

When FV is proxy by MTBR, we will replace SIZE, LEV and PROFIT variables as follow:

SIZE<sub>a</sub> = Natural logarithm of (total assets / total equity) (Hassan et al., 2009)

LEV<sub>a</sub> = Total liability / total equity (Hassan et al., 2009)

PROFIT<sub>a</sub> = Net profit / total equity (Hassan et al., 2009)

## Results and Discussion of Findings

### *Descriptive Statistics*

Table 3a shows descriptive statistics for the firm value variables. On average, Table 3a shows value of the sample firms measured based on Tobin's Q and MTBR were generally higher than 1. The value of MTBR and TOBIN above 1 means that the firm's market value exceeds the book value of assets owned by the firm. Based on kurtosis and skewness of MCAP, TOBIN and MTBR, data were not normal. Thus, following prior studies (Uyar & Kilic, 2012; Hassan et al. 2009 and Al-Akra & Ali, 2012) we transformed the MCAP, TOBIN and MTBR variables to natural logarithm (Ln). Descriptive statistics for the transformed data is shown in table 3b.

Table 3a: Descriptive Statistics for Dependent Variable before Transformation (N=395)

	<b>Average</b>	<b>Median</b>	<b>Standard Deviation</b>	<b>Skewness</b>	<b>Kurtosis</b>	<b>Minimum</b>	<b>Maximum</b>
MCAP							
YE	RM1,378,332,354	RM128,619,000	RM6,892,174,709	11.191	156.071	RM412,480	RM10,860,000,0000
6M	RM1,373,695,541	RM125,970,000	RM6,168,076,362	8.895	96.475	RM220,416	RM83,400,000,000
TOBIN							
YE	1.01	0.819	0.827	5.938	48.172	0.251	9.818
6M	1.04	0.816	0.900	6.145	51.732	0.231	10.926
MTBR							
YE	1.100	0.658	2.304	10.171	120.780	0.056	33.015
6M.	1.145	0.660	2.530	10.397	127.041	0.007	37.036

Where, MCAP= Market Cap; TOBIN= Tobin's Q; MTBR= Market to book value of equity ratio; YE= Year End; 6M= 6 months after year end

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Table 3b: Descriptive Statistics for Dependent Variable after Transformation (N=395)

	Average	Median	Standard Deviation	Skewness	Kurtosis	Minimum	Maximum
LnMCAP							
YE	18.883	18.67	1.73	0.79	1.25	12.93	25.41
6M	18.888	18.65	1.77	0.68	1.37	12.30	25.15
LnTOBIN							
YE	-0.133	-0.200	0.47	1.36	4.21	-1.38	2.28
6M	-0.118	-0.200	0.48	1.39	4.13	-1.47	2.39
LnMTBR							
YE	-0.333	-0.420	0.76	0.94	3.00	-2.88	3.50
6M.	-0.328	-0.420	0.82	0.41	4.37	-4.96	3.61

Where, LnMCAP= Natural logarithma of Market Cap; LnTOBIN= Natural logarithma of Tobin's Q;  
LnMTBR= Natural logarithma of Market to book value of equity ratio; YE= Year end; 6M= 6 months after year end

Figure 1: Levels of Voluntary risk management disclosure by category

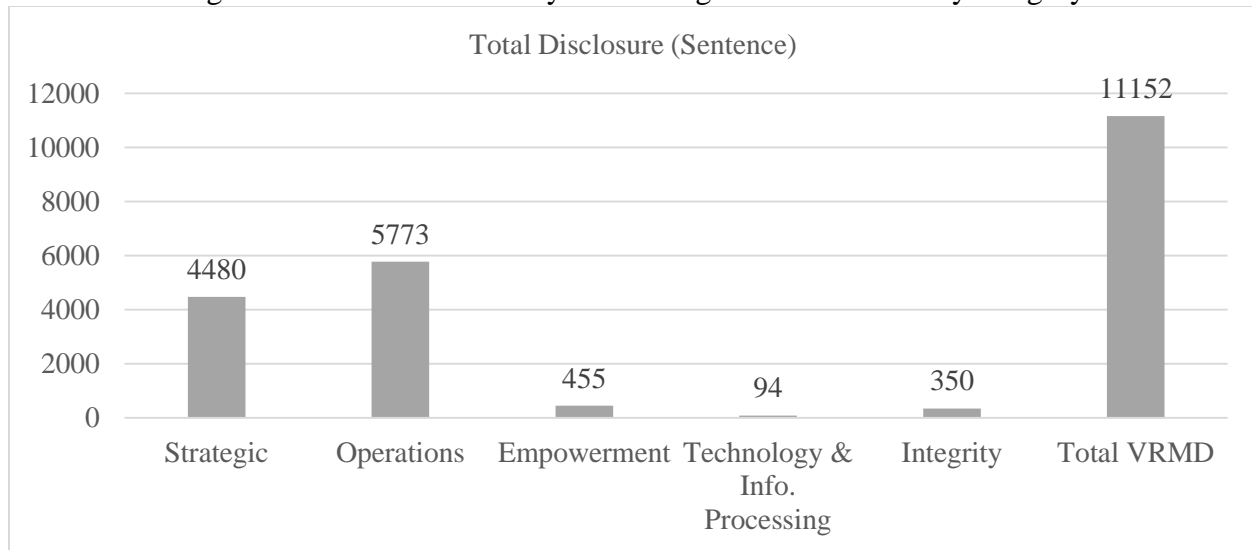
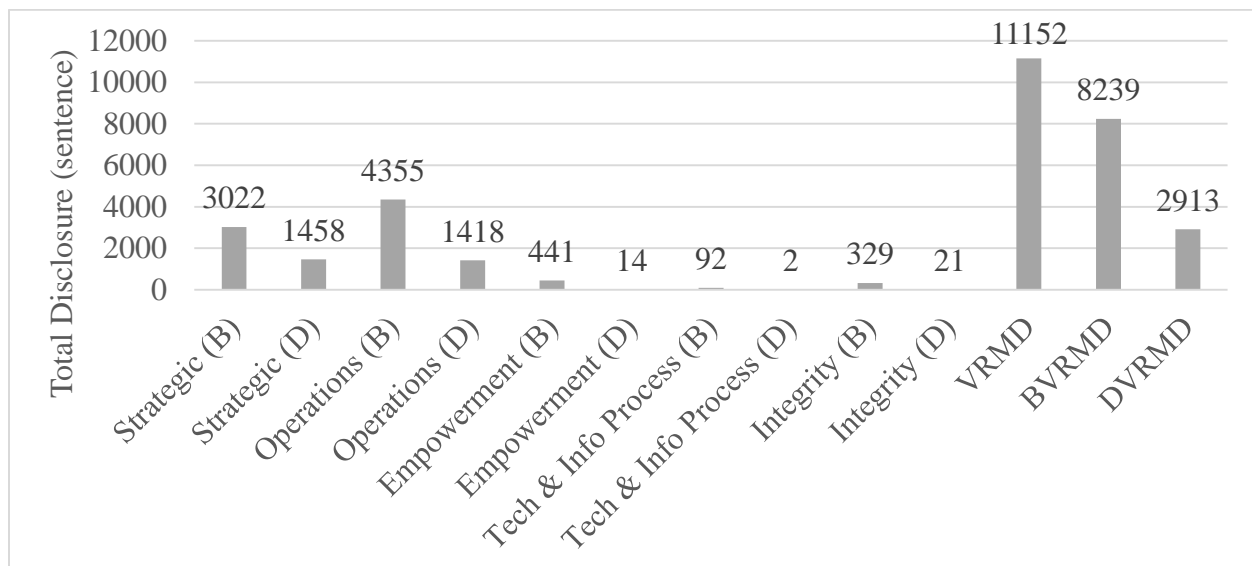


Figure 1 present the total voluntary risk management disclosure by category. Figure 1 shows that the highest level of disclosure falls under the operational risk, followed by strategic risk. Finding is consistent with Azlan et al. (2009), who found that both types of risk are most commonly disclosed in Annual Report. The least disclosed information was related to information of processing and technology risk, at a total of only 94 sentences. Total voluntary disclosure of risk management amounted to 11,152 sentences. Figure 2 present the disclosure level of beneficial and damaging risk management information. Figure 2 shows that sample firms tend to disclose more beneficial information rather than damaging information. This finding is consistent with Linsley and Shrives (2006), who also found that firms in the United Kingdom disclose more beneficial risk information than damaging risk information.

Figure 2: Levels of Beneficial (B) and Damaging (D) Voluntary Risk Management Disclosure



## VOLUNTARY RISK MANAGEMENT DISCLOSURE AND FIRM VALUE: EVIDENCE FROM MALAYSIAN LISTED COMPANIES

### *Univariate Analysis*

Table 4a, 4b and 4c show the result of the Univariate Pearson Correlation Test. The result shows that Voluntary Risk Management Disclosure (VRMD) and Beneficial Voluntary Risk Management Disclosure (BVRMD) have a positive and significant correlation with firm value ( $p < 0.01$ ). Damaging Voluntary Risk Management Disclosure (DVRMD) also has a significant positive correlation with LnMCAP ( $p < 0.01$ ). However, there is no significant relationship found between DVRMD with LnTOBIN and LnMTBR. In addition, the results show that SIZE has a significant positive correlation with LnMCAP and LnTOBIN but not significant with LnMTBR. While PROFIT has a significant positive correlation with all three of the firm value variables. The other variables, GROWTH and LEV were found to have mixed results with firm value.

Apart from testing the univariate correlation, Pearson Correlation test may also identify multicollinearity problem between independent variables. Table 4a, 4b and 4c show that there is no multicollinearity problem between independent variables except BVRMD with VRMD ( $r > 0.9$ ) and LnSIZEa with LnLEV<sub>a</sub> ( $r > 0.9$ ). The multicollinearity problem can be solved either by dropping one of the variables or performing a different analysis (Tabachnick & Fidell, 2001). Therefore, this study will address the multicollinearity problem by performing an analysis separately. Analysis that use LnMTBR as a proxy of firm value will be broken down into LnMTBR1 that control SIZEa while LnMTBR2 control LEV<sub>a</sub>.

Table 4a: Pearson Correlation Analysis (Firm Value proxy by LnMCAP)

	LnMCAP_YE	LnMCAP_6M	VRMD	BVRMD	DVRMD	SIZE	GROWTH	LEV	PROFIT 2010	PROFIT 2011
LnMCAP_YE	1									
LnMCAP_6M	.988**	1								
VRMD	.549**	.545**	1							
BVRMD	.551**	.552**	.968**	1						
DVRMD	.216**	.201**	.567**	.365**	1					
SIZE	.585**	.571**	.379**	.373**	.185**	1				
GROWTH	.073	.093	.040	.105*	-.202**	-.019	1			
LEV	.021	.009	.101*	.089	.062	.123*	.021	1		
PROFIT2010	.677**	.690**	.379**	.417**	.010	.308**	.171**	-.094	1	
PROFIT2011	.757**	.759**	.453**	.459**	.175**	.430**	.070	-.032	.801**	1

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Table 4b: Pearson Correlation Analysis (Firm Value proxy by LnTOBIN)

	LnTOBIN_YE	LnTOBIN_6M	VRMD	BVRMD	DVRMD	SIZE	GROWTH	LEV	PROFIT 2010	PROFIT 2011
LnTOBIN_YE	1									
LnTOBIN_6M	.958**	1								
VRMD	.298**	.297**	1							
BVRMD	.309**	.318**	.968**	1						
DVRMD	.077	.050	.567**	.365**	1					
SIZE	.251**	.253**	.533**	.526**	.242**	1				
GROWTH	.067	.084	.040	.105*	-.202**	.051	1			
LEV	.188**	.161**	.101*	.089	.062	.245**	.021	1		
PROFIT2010	.383**	.416**	.379**	.417**	.010	-.578**	.171**	-.094	1	
PROFIT2011	.385**	.401**	.453**	.459**	.175**	-.693**	.070	-.032	.801**	1

Table 4c: Pearson Correlation Analysis (Firm Value proxy by LnMTBR)

	LnMTBR_YE	LnMTBR_6M	VRMD	BVRMD	DVRMD	SIZEa	GROWTH	LEVa	PROFIT 2010a	PROFIT 2011a
LnMTBR_YE	1									
LnMTBR_6M	.941**	1								
VRMD	.301**	.298**	1							
BVRMD	.310**	.315**	.968**	1						
DVRMD	.084	.055	.567**	.365**	1					
SIZEa	.065	.034	.117*	.099*	.098	1				
GROWTH	.069	.111*	.040	.105*	-.202**	.001	1			
LEVa	.038	.008	.106*	.098	.055	.920**	.035	1		
PROFIT2010a	.346**	.404**	.176**	.239**	-.138**	-.184**	.289**	-.140**	1	
PROFIT2011a	.365**	.385**	.291**	.302**	.097	-.153**	.084	-.120*	.642**	1

Where LnMCAP= Log of Market Capitalization; LnTOBIN= Log of Tobin's Q; LnMTBR= Log of Market to book value of equity ratio;

YE= Year End; 6M= After 6 Months; VRMD = Voluntary Risk Management Disclosure; BVRMD= Beneficial Voluntary Risk Management Disclosure; DVRMD = Damaging Voluntary Risk Management Disclosure; SIZE = firm size; LEV= Leverage; SIZEa = firm size;

LEVa= Leverage; GROWTH = Growth; PROFIT = Profitability

\*\* . Significant at 0.01 (2-tailed)

\* . Significant at 0.05 (2-tailed).

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## *Multivariate Analysis and Discussion*

Table 5 shows the results of our multiple regression analysis. Share price in the firm value (FV) measurement was taken at two different time, first at the accounting year-end (YE) and second at 6 months after the accounting year-end (6M). We utilized the two dates in order to ensure that the firm value capture accounting information revealed in firms' annual reports. The 6 months after year-end date is based on the requirement of Bursa Malaysia that every listed firm is required to submit an annual report within 6 months from the last day of the accounting or financial year-end (Bursa Malaysia, 2012).

Table 5 shows that VRMD is positive and significantly associated with firm value in all firm value variables both at the end of the accounting year (YE) and also at the 6 months after (6M) ( $p < 0.01$ ). Table 5 also shows that the coefficient for the VRMD variable 6 months after the accounting year-end (6M) is higher than the coefficient at the accounting year-end (YE) (LnMCAP:  $0.008 > 0.007$ ; LnMTBR2:  $0.009 > 0.008$ ). This suggests that the positive relationship between VRMD and firm value tend to be stronger in the 6 months after the accounting year-end suggesting possibility that investors have taken into consideration more information when deciding upon firm value at the later date, as expected.

The significant positive relationship between VRMD and firm value support the claim that investors require risk management information to help them make better investment decisions (FRC, 2011; Linsley & Shrivess, 2006). Risk management information disclosed by the firm should increase investors' confidence in the performance and prospects of the firms. Finding is also consistent with Solomon et al. (2000) who found that nearly one-third of their institutional investors' respondents stated that they need risk-related information to improve their portfolio investment decision making. Our preliminary findings seem to reject the assumption that risk management disclosure could have a negative impact on firm value (FRC, 2011).

We also run additional tests to examine the impact of both beneficial and damaging VRMD on firm value. Table 6 shows that the beneficial voluntary risk management disclosure (BVRMD) has a positive and significant relationship with firm value ( $p < 0.01$ ). This finding support hypothesis 2a. Table 6 also shows that coefficient for the BVRMD variable 6 months after the accounting year-end (6M) is higher than the coefficient at the accounting year-end (YE) (LnMCAP:  $0.01 > 0.009$ ; LnTOBIN:  $0.006 > 0.005$ ; LnMTBR1:  $0.01 > 0.009$ ). Findings support the theory that firms would try to influence reaction of stakeholders by way of disclosure (Wallace & Naser, 1995; Mavlanova et al., 2012). In other words, firms tend to disclose more beneficial risk management information to signal their good performance and prospect.

With regards to the damaging voluntary risk management disclosure (DVRMD), the multivariate analysis did not find any significant association between DVRMD and firm value. Hence, this finding did not support hypothesis 2b that proposed DVRMD to have a negative association with firm value. A possible explanation for this finding is probably even though investors were informed that a firm might be exposed to danger or threat (damaging risks), but at the same time firms also informed that the damaging risks are being properly managed, hence controllable. This argument is in line with Tessarolo et al. (2010) that found firms have incentive to create positive image by "neutralizing" negative information with positive information.

In terms of control variables, Tables 5 and 6 show that SIZE has a positive relationship with firm value proxy by LnMCAP and LnMTBR but has a negative relationship with LnTOBIN. This is consistent with prior studies. Several studies found SIZE positively related to firm value

(such as Uyar & Kilic 2012; Anam et al. 2011; Al-Akra & Ali 2012; Hassan et al., 2009) because large firms tend to disclose more voluntary information than small firms. Disclosing more information tend to increase investors or lenders confidence about the performance and prospects of the firms (Healy & Palepu, 2001; Mazumdar & Sengupta, 2005). Other studies found SIZE negatively associated with firm value (including Orens et al., 2009; and Amran & Ahmad, 2009).

In addition, Tables 5 and 6 show that LEV has a positive relationship with firm value proxy by LnMCAP but negative with LnTOBIN. According to Al-Akra and Ali (2012), the positive relationship between LEV and firm value can be explained by agency theory where firms with high leverage will reduce agency costs through the disclosure of information. This accordingly may reduce the information asymmetry between stakeholders and firm and thus increase the firm value. Tables 5 and 6 also show that PROFIT has a positive and significant relationship with firm value. This is consistent with prior studies such as Anam et al. (2011); Uyar & Kilic (2012); Al-Akra & Ali (2012); Hassan et al. (2009) and Orens et al. (2009). Similar to prior studies (Uyar & Kilic 2012; Hassan et al. 2009), we found no significant association between GROWTH and firm value.

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Table 5: Multiple Regression Analysis to test relationship between VRMD and FV

Variables	LnMCAP (YE)	LnMCAP (6M)	LnTOBIN (YE)	LnTOBIN (6M)	LnMTBR1 (YE)	LnMTBR1 (6M)	LnMTBR2 (YE)	LnMTBR2 (6M)
Constants	1.8503 (2.272)**	2.062 (2.406)**	0.964 (2.005)**	1.029 (2.203)**	-0.771 (-4.718)***	-0.899 (-5.250)***	-0.625 (-3.524)***	-0.783 (-4.288)***
VRMD	0.007 (3.502)***	0.008 (3.585)***	0.004 (3.380)***	0.004 (3.172)**	0.008 (4.174)***	0.008 (4.299)***	0.008 (4.363)***	0.009 (4.499)***
SIZE	0.862 (19.748)***	0.842 (18.856)***	-0.083 (-3.164)***	-0.0872 (-3.453)***				
LEV	-1.298 (-5.263)***	-1.355 (-5.269)***	0.630 (4.991)***	0.598 (4.669)***				
PROFIT2010	4.94E-09 (3.477)***	5.95E-09 (3.976)***	2.99E-09 (3.865)***	3.60E-09 (4.523)***				
PROFIT2011	5.71E-09 (3.344)***	5.99E-09 (3.375)***	3.37E-09 (3.747)***	3.30E-09 (3.710)***				
GROWTH	0.048 (0.341)	0.193 (1.338)	0.016 (0.188)	0.0529 (0.708)	-0.060 (-0.390)	0.040 (0.282)	-0.056 (-0.364)	0.462 (0.321)
SIZEa					0.219 (1.952)**	0.189 (1.637)*		

Variables	LnMCAP (YE)	LnMCAP (6M)	LnTOBIN (YE)	LnTOBIN (6M)	LnMTBR1 (YE)	LnMTBR1 (6M)	LnMTBR2 (YE)	LnMTBR2 (6M)
PROFIT2010a					1.548 (3.446)***	2.094 (4.688)***	1.482 (3.298)***	2.025 (4.512)***
PROFIT2011a					1.396 (3.424)***	1.321 (2.952)***	1.356 (3.292)***	1.278 (2.844)***
LEV <sub>a</sub>							0.054 (1.344)	0.037 (0.900)
Adjusted R <sup>2</sup>	0.841	0.829	0.236	0.250	0.200	0.227	0.202	0.221
F Statistic	349.364	318.396	21.236	22.834	20.517	24.118	19.657	23.392
P Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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Table 6: Multiple Regression Analysis to test relationship between BVRMD, DVRMD and FV

Variables	LnMCAP (YE)	LnMCAP (6M)	LnTOBIN (YE)	LnTOBIN (6M)	LnMTBR1 (YE)	LnMTBR1 (6M)	LnMTBR2 (YE)	LnMTBR2 (6M)
Constant	1.876 (2.269)**	2.111 (2.406)**	0.983 (2.008)**	1.069 (2.237)**	-0.712 (-3.954)***	-0.827 (-4.314)***	-0.566 (-3.113)***	-0.710 (-3.743)***
BVRMD	0.009 (3.233)***	0.01 (3.453)***	0.005 (2.993)***	0.006 (3.059)***	0.009 (3.512)***	0.01 (3.740)***	0.009 (3.625)***	0.009 (3.885)***
DVRMD	-0.001 (-0.073)	-0.002 (-0.289)	0.0001 (0.032)	-0.002 (-0.339)	0.001 (0.086)	-0.0005 (-0.057)	0.001 (0.157)	0.0007 (0.007)
SIZE	0.864 (19.591)***	0.845 (18.646)***	-0.082 (-3.090)***	-0.0865 (-3.373)***				
LEV	-1.297 (-5.205)***	-1.355 (-5.204)***	0.631 (4.928)***	0.598 (4.582)***				
PROFIT2010	4.70E-09 (3.154)***	5.61E-09 (3.597)***	2.87E-09 (3.443)***	3.39E-09 (3.936)***				
PROFIT2011	5.85E-09 (3.426)***	6.18E-09 (3.455)***	3.44E-09 (3.834)***	3.41E-09 (3.827)***				
GROWTH	0.011 (0.080)	0.145 (0.995)	-0.004 (-0.048)	0.023 (0.317)	-0.087 (-0.570)	0.006 (0.042)	-0.082 (-0.536)	0.013 (0.091)
SIZEa					0.224 (1.966)**	0.193 (1.650)*		

Variables	LnMCAP (YE)	LnMCAP (6M)	LnTOBIN (YE)	LnTOBIN (6M)	LnMTBR1 (YE)	LnMTBR1 (6M)	LnMTBR2 (YE)	LnMTBR2 (6M)
PROFIT2010a					1.468 (2.965)***	1.993 (4.043)***	1.406 (2.827)***	1.925 (3.883)***
PROFIT2011a					1.453 (3.575)***	1.386 (3.129)***	1.409 (3.437)***	1.341 (3.014)***
LEV <sub>a</sub>							0.055 (1.346)	0.038 (0.902)
Adjusted R <sup>2</sup>	0.841	0.829	0.234	0.25	0.195	0.225	0.188	0.219
F Statistic	298.626	272.772	18.191	19.791	16.93	20.022	16.183	19.385
P Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Where LnMCAP= Log of Market Capitalization; LnTOBIN= Log of Tobin's Q; LnMTBR= Log of Market to book value of equity ratio; YE= Year End; 6M= After 6 Months; VRMD = Voluntary Risk Management Disclosure; BVRMD= Beneficial Voluntary Risk Management Disclosure; DVRMD = Damaging Voluntary Risk Management Disclosure; SIZE = firm size; LEV= Leverage; SIZE<sub>a</sub> = firm size; LEV<sub>a</sub>= Leverage; GROWTH = Growth; PROFIT = Profitability

\*\*\*significant at p<0.01      \*\*significant at p<0.05      \*significant at p<0.1

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### Conclusion

This study examine the effect of voluntary risk management disclosure on firm value. The results of univariate and multivariate test show that voluntary risk management disclosure (VRMD) and beneficial voluntary risk management disclosure (BVRMD) tend to be positive and significantly associated with firm value. The expectation that damaging voluntary risk management disclosure (DVRMD) would negatively influence firm value was not supported. The univariate test found a positive and significant relationship between DVRMD and firm value. Even though there is tendency that in the multivariate analysis showed DVRMD to have a negative association with firm value, however they were not significant.

Findings from this study is expected to have important implications to the regulatory bodies, firms, and investors. To date, regulatory bodies emphasized more on financial risk management disclosure through the enforcement of MFRS 7. While non-financial risk information has been less emphasized compared to the financial risks information as current guidelines such as *Malaysian Code on Corporate Governance* (MCCG) (2012) and *Recommended Practice Guide 5 (Revised)* issued by the Malaysian Institute of Accountants (MIA) only require firms to disclose information about non-financial risk management without specific details. As this study has provided evidence on the significance of non-financial risk management disclosures in the capital market, this study could be useful for the regulatory bodies to develop guidelines on non-financial risk management disclosure in the future.

Findings from this study would also provide evidence that might increase incentives for firms to voluntarily disclose more information about non-financial risk management since it could increase their value. Findings also provide evidence to investors in terms of to be more alert when making investment decisions involving firms' risks since risk management disclosure do tend to be positively associated with firm value.

Notwithstanding the critical empirical findings, this study is limited to only focusing on a one year data. Future studies might consider conducting analysis on a more than one year data to capture issues that might arise in the voluntary risk management disclosure level when investigated between years.

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## APPENDIX A

### DECISION RULES FOR VOLUNTARY RISK MANAGEMENT DISCLOSURE

1. A sentence is coded as voluntary risk management disclosure if the sentence
  - a) Is explaining changes in the firm's risk exposure over the previous twelve months, as a result of changes to the strategy or business environment, and indicating if it might change in the future (FRC, 2011) or
  - b) Is explaining on how key risks were being mitigated (FRC, 2011).
2. One (1) mark will be given to each sentence that contains voluntary risk management disclosure.
3. The voluntary risk management disclosure shall be classified according to the grid listed in Appendix B. If a sentence has more than one possible classification, the information will be classified into the category that is most emphasized within the sentence (Linsley & Shrives, 2006).
4. The voluntary risk management disclosure will also be classified as “beneficial” or “damaging” information.
  - a) Risk management disclosure is classified as “beneficial” if it discusses information about opportunities or prospects which have or may have a positive impact on firms (Linsley & Shrives, 2006). Information on how key risks were being mitigated are also categorized as beneficial information because the purpose of a firm to manage risks is to protect and create value for the investor (Beasley et al., 2005).
  - b) Risk management disclosure is classified as “damaging” if it discusses information about threats or hazards which have or may have a negative impact on the firm (Linsley & Shrives, 2006).
5. Tables (whether having quantitative or qualitative data) that provide risk information should be interpreted as one line equals to one sentence and classified accordingly (Linsley & Shrives, 2006)
6. Any disclosure that is repeated shall be recorded as a risk disclosure sentence by itself each time it is discussed (Linsley & Shrives, 2006)
7. If a disclosure is too vague in its reference to risk, then it shall not be recorded as a risk disclosure (Linsley & Shrives, 2006)

# VOLUNTARY RISK MANAGEMENT DISCLOSURE AND FIRM VALUE: EVIDENCE FROM MALAYSIAN LISTED COMPANIES

## APPENDIX B

### CATEGORIES OF VOLUNTARY RISK MANAGEMENT DISCLOSURE (Based on Linsley & Shrives, 2006)

<b>Risk Category</b>	<b>Risk Factors</b>
Operations risk	<ul style="list-style-type: none"><li>• Customer satisfaction</li><li>• Product development</li><li>• Efficiency and performance</li><li>• Sourcing</li><li>• Stock obsolescence and shrinkage</li><li>• Product and service failure</li><li>• Environmental</li><li>• Health and safety</li><li>• Brand name erosion</li></ul>
Strategic risk	<ul style="list-style-type: none"><li>• Environmental scan</li><li>• Industry</li><li>• Business portfolio</li><li>• Competitors</li><li>• Pricing</li><li>• Valuation</li><li>• Planning</li><li>• Life cycle</li><li>• Performance measurement</li><li>• Regulatory</li><li>• Sovereign and political</li></ul>
Empowerment risk	<ul style="list-style-type: none"><li>• Leadership and management</li><li>• Outsourcing</li><li>• Performance incentives</li><li>• Change readiness</li><li>• Communications</li><li>• Management and employee fraud</li></ul>
Integrity risk	<ul style="list-style-type: none"><li>• Illegal acts</li><li>• Reputation</li></ul>
Information processing and technology risk	<ul style="list-style-type: none"><li>• Integrity</li><li>• Access</li><li>• Availability</li><li>• Infrastructure</li></ul>

## AGENT-BASED SIMULATION IN FINANCE: DESIGN CHOICES

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**Abstract.** *To understand the behavior of financial markets, and predict possible financial crises, we have to analyze market microstructure. Agent-based simulation is one of the most successful innovations in modeling complex behavior. The availability of computing power and access to financial market data has opened up new avenues for scientific research. While classical financial approaches fail to explain some existing phenomena, agent-based simulations offer a potential approach for understanding the behavior of financial markets. The paper briefly outlines the scope and agenda of agent-based financial simulation research. In particular, this paper outlines the design choices need to be made in building agent-based market.*

**Keywords:** *Efficient markets, behavioral finance, market microstructure, Agent-based markets, Agent-based simulations.*

### Introduction

Classical economic theories are based on strong simplifying assumptions such as perfect rationality, homogeneity and the efficient market hypothesis (Bachelier (1964); Fama (1965)). Some of the assumptions used in classical economic theories are flawed, and hence fail to explain financial market behavior, the forces that drive such behavior, and were unable to predict recent financial crises (Grossman and Stiglitz (1980); Lo (1988)). The current availability of financial market data enables significantly richer analysis (Dacorogna et al. (2001)). Researchers can now work to identify patterns in the financial market data to explain the behavior in such markets.

The difference between classical economic theories and the empirical properties observed in financial market data, are the main driving force behind the essential need for the development and the usage of alternative approaches. By way of illustration, the theory of bounded rationality has completely replaced the theory of full rational homogeneous representative agents (Simon (1982)).

Advances in computing have significantly improved research in the field of finance. Financial transactions are now recorded at high frequency. Processing power has improved in such a way as to allow researchers to analyze with increasing efficiency, large amounts of data. Processing power also enables us to simulate complex behavior which opens new avenues for studying finance. Traditional analytical models present challenges in analyzing financial market data due to the current large amount and complexity of data compared to earlier times (Martinez-Jaramillo and Tsang (2009)).

Agent-based simulations in finance have emerged as an alternative scientific approach with regard to the study of dynamic behavior in financial markets, and has

allowed us to relax some of the strong assumptions in classical economics and financial theory where the usage of analytical models is difficult, and may possibly not be able to provide satisfactory results or practical insights. Agent-based simulations allow researchers to investigate different simplified scenarios of complex behaviors to analyze the characteristics of such behavior, and to examine what can be beneficially inferred from market information. They can be used to answer what-if questions, e.g. what will be the consequence of a big order in the market? What will happen if the Central Bank reduces the interest rate for mortgages? What will happen to the stock market if a particular stock index collapses?

Agent-based simulations have been effectively applied in different financial studies such as ones dealing with macroeconomic models, market risk, portfolio optimization, decision making, forecasting, retail markets and payment card markets, among many others. A good introduction to agent-based financial market simulations can be found in Tesfatsion (2002). For a synopsis of the most influential works in the area of agent-based financial simulations, we refer interested readers to LeBaron (2001a, 2006); Samanidou et al. (2007); Cristelli et al. (2011). Agent-based simulations give rise to a complete new area of scientific research in the field of finance, which is the subject of this paper. This paper aims to define the scope and agenda of agent-based financial market simulation research. The design choices need to be made in building agent based market for studying the financial markets issues are presented in the course of discussions in the paper. This paper is not meant to be a complete survey of agent-based financial market simulation research, since a full survey would need more space than it available in this paper.

### **Agent-Based Financial Markets**

ABMs have emerged as indispensable tools in exploring and understanding the trading behavior in financial markets Farmer and Foley (2009). These are in essence computer programs that simulate the financial markets behaviour which comprises different features such as a market mechanism, traded assets and trading agents that could be modelled to emulate the behavior of human traders. In modelling a specific market, it is important that this is able to reproduce the same stylized facts as those exhibited by the corresponding real one Cristelli et al. (2011); LeBaron (2001a). The observed statistical properties of the financial market data are referred to as stylized facts Dacorogna et al. (2001). For a good review of the work conducted in the area of ABMs, we refer interested readers to Cristelli et al. (2011); LeBaron (2001a, 2006); Samanidou et al. (2007).

Recently, the ABM area has witnessed a continuous increase in the number of works produced. Samanidou et al. in Samanidou et al. (2007) provided an overview of some influential ABM used by economists and physicists, and the contributions previously made by a number of researchers in this field. LeBaron in LeBaron (2006) provided a survey on some of the important works done in ABMs. He focused on how computational tools, in particular ABMs, are necessary for the exploration and understanding of the financial markets due to the limitations of the analytical models. Several design routes have been used in ABMs, and in many cases it is difficult to differentiate one model from the others.

## Design Choices in ABMs

In designing and developing an ABM, several design choices need to be made regarding the trading strategies, market mechanism, traded assets, timing, etc. Different choices can be made depending on the underlying purpose for developing the ABM. However, all the developed ABMs are based on the same concept in that the macro behaviour is a result of the micro interactions of the market participants LeBaron (2001a). A good review of the design choices for building an ABM can be found in Cristelli et al. (2011); Grothmann (2002); LeBaron (2001a).

### *Agent Trading Strategy*

The trading strategies of the agents that will be used in an ABM constitute, without doubt, the most important design question and decision when building a model of financial markets LeBaron (2001a). In the literature, the design of the agent's trading strategies in an ABM ranges from simple budget constrained zero intelligence agents as in Gode and Sunder (1993a); Bak et al. (1997); Becker (1962); Challet and Stinchcombe (2001); Daniel (2006); Duffy and Unver (2006); Gode and Sunder (1993b); Jamal and Sunder (1996, 2001); Sunder (2004); Ussher (2008); Farmer et al. (2005); Aloud et al. (2011) to intelligent agents as in Arifovic (1994, 1996); Arthur et al. (1997); Chen and Yeh (2001); Cliff and Bruten (1997a); Cliff (1998, 2003); Edmonds (1999); Kirman et al. (2007); LeBaron (2002); Liu et al. (2010); Lux et al. (2005); Mantegna and Stanley (1995); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009); Serguieva et al. (2011); Yang (2002); Yeh and Chen (2000); Zimmermann et al. (2001b); Aloud and Fasli (2012).

### *Real-world strategies*

There are several design choices that one can take when representing the trading agents that will participate in the market LeBaron (2001a). One way to model agents is to endow them with strategies that emulate those used by real traders LeBaron (2001a). One of the drawbacks is that the dynamics of the asset price is the result of these mapped trading strategies. Thus, what if a number of essential trading strategies which exist in the real market were left out, or what if the agents' believed it was necessary to change their current trading strategy LeBaron (2001a). Also, it is not easy to find out exactly how real traders operate. Another drawback is that this type of agent might lack a well-defined objective (utility) function. There are a number of useful aspects associated with having a well-defined utility function for evaluation purposes LeBaron (2001a). An example is that agents can measure and evaluate their performance in the market using a utility function. A further drawback is that this type of agent does not change their trading strategy, whereas traders in the real market are likely to change their trading strategy over time Martinez-Jaramillo and Tsang (2009).

### *Zero intelligence*

Another type of trading strategy is the zero intelligence (ZI) in which the agent's behavior is random ruled by a simple budget constraint. Although their trading behaviour gives the impression of being a form of learning, these type of agents do not learn. Becker in Becker (1962) showed that budget constraint strategies can

ensure the appropriate slope of the supply and demand curves. Gode and Sunder in Gode and Sunder (1993a) were the first to introduce the concept of the ZI agent. The authors used this type of agent to model market transactions in double auctions. ZI agents were used in Bak et al. (1997); Challet and Stinchcombe (2001); Daniel (2006); Duffy and Unver (2006); Farmer et al. (2005); Jamal and Sunder (1996, 2001); Sunder (2004); Ussher (2008); Aloud et al. (2011, 2012). The drawback of the use of ZI agents is the lack of a clearly defined trading strategy. Therefore, randomness in the agents' trading behaviour creates an element of vagueness in understanding the reasons behind the agents' decisions and overall effect on the market.

### *Learning and adapting strategies*

In a financial market environment, learning is important where agents may improve their behaviour/ utility by being able to recognise patterns, learn trends and adapt to the new conditions in the market. An example of ABMs use such a type of agent is the SF ASM LeBaron (2002). Similar to these are the ones done by Arifovic (1994, 1996); Arthur et al. (1997); Chen and Yeh (2001); Cliff and Bruten (1997a); Cliff (1998, 2003); Edmonds (1999); Kirman et al. (2007); Liu et al. (2010); Lux et al. (2005); Mantegna and Stanley (1995); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009); Serguieva et al. (2011); Yang (2002); Yeh and Chen (2000); Zimmermann et al. (2001b); LeBaron (2012, 2011). This type of agent uses a variety of artificial intelligence techniques to model changes in agent strategies. This approach has a number of drawbacks LeBaron (2001a). Among them is the complexity of the computational tools that are used in modeling the trading agents. In addition, the complexities of the evolved agents' strategies represent a limitation in the analytical tractability of agents' behaviour. Also, there are limitations on the search space of trading rules caused by the design of the agents' trading strategies. As some of these learning strategies attempt to find the best decision rule by searching a space of trading/decision rules, if this space is very big, they may not be able to find the best rule within an acceptable amount of time.

### *Forecasts of future prices*

There are agents who are modelled to forecast future price changes. This type of agent uses a number of evolutionary techniques to model the forecasting mechanism. These evolutionary techniques are: artificial neural networks, genetic algorithms, learning classifier systems and genetic programming. Agents adopting a forecasting strategy were used in Arifovic (1996); Arthur et al. (1997); Chen and Yeh (2001); Edmonds (1999); Kirman et al. (2007); LeBaron (2001b); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009); Yang (2002); Yeh and Chen (2000); Zimmermann et al. (2001a); Amilon (2008). The forecasting of future prices can be fed into (a) the agent decision making framework as in the SF ASM LeBaron (2002) or (b) progress the agent decisions directly such as in Arifovic (1994).

### *Objective function*

A different way to design the agents is to make use of an objective function. Agents could be modelled with an objective function either implicitly or explicitly with regard to the agent's decision making process. An implicit objective function implies that the agent's objective is incorporated indirectly into the decision making process.

An example of an implicit objective function is maximizing the agent's outcomes Farmer (1998); Amilon (2008); Levy et al. (1994).

On the other hand, most of the agents in ABMs have an explicit objective function where the agent's performance in the market can be measured through the use of a utility function. Examples of such models are the ones developed by Arthur et al. (1997); Chen and Yeh (2001); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009); Palmer et al. (1994); Yang (2002); Yeh and Chen (2000); Zimmermann et al. (2001b).

### *Social learning*

There are agents whose strategy is based on observing other individuals' trades in the market and adjusting their strategies based on the observed actions of these other traders. This phenomenon is often called social learning or herding behaviour LeBaron (2006). An example of ABMs using such an agent are the models introduced in Kirman (1993); Lux (1995); Bak et al. (1997); Lux (1998); Cont and Bouchaud (2000); Alfarano et al. (2005); Alfarano and Lux (2006); Hott (2009). These ABMs aim to model the trading agents by incorporating herding behaviour. Hott showed in Hott (2009) that price bubbles can be explained by herding behaviour.

We have summarized above the most important design issues regarding the modelling of the trading agents strategies. In addition, we have illustrated some examples of ABMs which use different trading strategies.

## **Market Mechanism**

The market mechanism is the second most important design question which faces researchers when building an ABM LeBaron (2001a). There is a variety of trading mechanisms that one can use in an ABM. The majority of ABMs follow four methods of solving this design problem.

The simplest way is to assume that price movements respond to the excesses of demand and supply. Thus, if there is an excess of demand, the price will rise. Conversely, if there is an excess of supply, the price falls. An earlier version of the SF ASM used this trading method LeBaron (2001a). There are some ABMs that use the same method for the trading mechanism including Chen and Yeh (2001); Cont and Bouchaud (2000); Farmer (1998); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009). In Farmer and Joshi (2002), the author used a similar trading mechanism but the excess demand or supply for assets is filled by a market maker. In Sansone and Garofalo (2007), during the simulation, the price was amended by a market maker in the direction of the excess demand. This type of market mechanism has a number of advantages: (a) it is fast, (b) it pressures a market continuously in disequilibrium and (c) it facilitates the analytical tractability of market behaviour LeBaron (2001a). Nevertheless, it has some drawbacks among which is the sensitivity of the parameters used, and the fact that some orders never get satisfied LeBaron (2001a).

Alternatively there is a model of the market where a local equilibrium price can easily be found. Such types of market mechanisms have the advantage of generating a well-defined demand function for the agents. However, this method requires us to

define a market with more economic structure, so that a certain temporal equilibrium price can be found Martinez- Jaramillo and Tsang (2009). Examples of ABMs using this type of trading mechanism are Arthur et al. (1997); Levy et al. (1994).

The third trading mechanism is to model the actual trading mechanism found in markets. This method implies the implementation of a realistic trading mechanism as used in a real market. According to LeBaron in LeBaron (2001a), this method is the most appealing in terms of the modelling of a high-frequency market. Such a method gives the developer of the ABM a lot of market structure to work with LeBaron (2001a).

An alternative to the three aforementioned market mechanisms is to implement a continuous double auction mechanism with limit orders, and some other realistic features present in real markets. Some examples of such models are Cliff and Bruten (1997b,c); Cliff (1998, 2009); Daniel (2006); Gilli and Winker (2003); Gode and Sunder (1993a,b); Gode et al. (2004); Iori and Chiarella (2002); Jamal and Sunder (1996, 2001); Raberto and Cincotti (2005); Rayner et al. (2011); Yang (2002); Kirman (1993).

### *Assets*

The traded assets are an important characteristic of every ABM. There are mainly three different issues regarding the modelling of the traded assets: number of assets, types of assets and finally the assets' properties. Regarding the number of traded assets, the majority of ABMs have two different assets: a risk free asset and a risky asset LeBaron (2001a). A small number of ABMs operate with many more than two assets in the market such as Cincotti et al. (2005); Kirman and Teyssiere (2002); Westerhoff (2004); Zimmermann et al. (2001b). The main reason for restricting the market to operating just with two assets is because this facilitates the analysis of the individual traders' and overall market behaviour; having more than two assets in the market can make the analysis very complicated.

Regarding the types of assets, in most of the ABMs, the agents have the choice of opting for a risky asset or a risk-free one Alfi et al. (2009); Arthur et al. (1997); LeBaron (2002); Marchesi et al. (2000); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009); Yang (2002); Kim and Markowitz (1989); Levy et al. (1994); LeBaron (2012, 2011); Aloud et al. (2012). Each asset has different properties. For instance, the risk-free asset could be cash or bonds, while the risky one could be a stock, a currency or even a security associated to a fundamental value.

### *Time*

Timing is another important design issue in building ABMs. In an ABM, timing refers to many things including the time span of the previous information considered by the agents. This is an important issue in terms of an ABM as almost all the learning mechanisms are fed by previous information. LeBaron in LeBaron (2001c) performed an experiment to explore the impact of different memory lengths of the agents with regard to market prices. Timing refers also to the order in which events occur. In other words, trading in most ABMs is synchronized by the designer LeBaron (2001a). These models are based on the assumption that all trades take place between two discrete points in time, whereas in reality there are no fixed periods. Some examples of ABMs with trading synchronization are Alfi et al. (2009); Arthur et al. (1997); Chen and Yeh (2001); Farmer (1998); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009).

Timing refers also to the frequency with which agents update their strategies. As can be observed from reality, traders update their behavioural rules over time, and this has a significant impact on their performance and on market prices. For example, agents in LeBaron (2001b); Markose et al. (2003); Martinez-Jaramillo and Tsang (2009) updated their strategies in the market periodically while in Markose et al. (2003); Martinez-Jaramillo and Tsang (2009); Winker and Gilli (2001) the periodicity of the strategies is updated through a trading behavioural constraint.

In the literature, there are some empirical studies such as Boer et al. (2006); Daniel (2006) show that the dynamic behaviour of the ABM differ, according to whether the state of the ABM is updated in continuous-time or in discrete-time. Continuous-time implies that at time  $t$  of the simulation run, all agents send their orders and update their beliefs. Afterwards, the time of the simulation run changed to  $t+1$ . The Grand Canonical Minority Game Jefferies et al. (2000) and CHASM Martinez-Jaramillo and Tsang (2009) imply discrete-time in which the market allows agents to place an order or to hold. As a result, the number of agents takes part in the total demand and supply is not constant at every single time of the simulation run. These two ABMs do not present a realistic level of synchronisation, as at every time of the simulation run, each agent has to carry out some trading computation. The Genoa Artificial Stock Market Raberto and Cincotti (2005) introduced a new approach where the determination of the agents who will be active in the next period of the simulation run is drawn randomly. This randomisation alone is not adequate as it would be ambiguous for the arrival time of the order. In Boer et al. (2006); Daniel (2006), their studies conclude that the asynchronous nature of trading in the financial markets fundamentally has to be considered in ABMs.

### *Benchmark and Validation*

Nearly all ABMs throw up many important questions during the validation of the various ABM structures LeBaron (2001a). ABMs that emulate the behaviour of real financial markets have to exhibit the same stylized facts as real ones LeBaron (2006). In an ABM, the observation of the same stylized facts as the real market serves as benchmark and evidence that the ABM is indeed closely reproduce the behaviour of the real market. An ABM can be validated in a number of ways. One approach is to make useful benchmark cases in which the behaviour of the market is well defined LeBaron (2001a). Another approach is to use parameters in the ABM resulting from either real markets or ABMs Chen and Yeh (2001); LeBaron (2003); Lux (1998); Winker and Gilli (2001); Zimmermann et al. (2001a,b).

Due to the large number of parameters that one could potentially set in an ABM, one has numerous degrees of freedom LeBaron (2001a). However, the potential to have a very large number of parameters raises some difficulties and complexities when designing an ABM LeBaron (2001a). Often unnecessary complexity makes it hard to identify which elements of the ABM are responsible for the emergence of the stylized facts and whether all of the elements are equally essential for reproducing them LeBaron (2006). The appropriate selection of the market parameters is a crucial element of the design but, at the same time, it is a tricky one. Researchers should do experiments with different values for each parameter and then track the changes in market behaviour. This allows them to define exactly the parameters that will lead the model to reproduce some real market features LeBaron (2001a).

## Conclusion

The limitations of both the behavioural finance and analytical model approaches, and the potential significance of the agent-based modelling approach, have motivated us to explore the work in the area of ABMs. ABMs are capable of gradually improving our understanding of the behaviour of financial markets in a simplified way. They are capable of addressing a variety of current issues in the financial markets, and may lead to new findings about financial behavior in various situations. The importance of ABMs has motivated the continuous development of new and efficient ABMs.

One of the crucial limitations of ABMs is the challenge of convincing someone who subscribes to the traditional analytical financial methods of the significant potential of the ABM in improving our understanding of the dynamic behaviour of financial markets. Furthermore, some of the important assumptions in finance, such as homogenous expectations and full rationality, are rejected in ABMs, and this always creates debate Fama (1970, 1991); Shleifer (2000).

The ABMs literature reveals some of the objective and design limitations of such models. On the objective limitations side, one of the major limitations is that the majority of ABMs focus on reproducing some of the stylized facts of financial markets, while they pay much less attention to identifying the essential elements that are accountable for the emergence of the market stylized facts Levy et al. (1994); LeBaron et al. (1999). Identifying such essential elements should be the primary objective of any ABM since such identification leads us to an understanding of the origin of the market stylized facts LeBaron (2001b).

With regard to the design limitations, there are two major criticisms rendered against ABMs: (a) their underlying complexity and (b) the synchronicity issue of trading events. The complexity of some of the ABMs prevents us from identifying the essential elements which are accountable for the emergence of financial market stylized facts LeBaron (2006); Hommes (2006); Samanidou et al. (2007). It is essential for any ABM to be as simple and as clear as possible, to facilitate the exploration of the market, and to allow an understanding of the market dynamics in addition to certain phenomena present in the market.

The timing issue represents a crucial limitation in ABMs LeBaron (2001a). In the majority of such markets, trading is synchronized and, most importantly, there are no representations of physical time in terms of the market Levy et al. (1994); Zimmermann et al. (2001a); Martinez-Jaramillo and Tsang (2009). Also, most of these ABMs use low-frequency timing such as daily timing Martinez-Jaramillo and Tsang (2009), in order to represent time, which doesn't reflect the real market. There is a need to address this very important issue.

One of the main ABM constraints is the validation LeBaron (2001a, 2003, 2006). The lack of market data, especially HFD, as a means of validating the accuracy of ABMs, appears to be an obvious critical issue in many ABMs. In addition, a great deal of work is needed to choose the essential parameters for an ABM. Most importantly, justifying the values taken by such parameters is a critical task requiring a great deal of caution.

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# DO THAI REAL ESTATE ADD VALUE TO INVESTMENT PORTFOLIO THAILAND EVIDENCE IN 1994-2013

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**Abstract:** *This study examine the role of Thai real estate sector with regard to their value added performance after adding real estate to a stock portfolio (benchmark portfolio) from a Thai perspective over the period 1994M1 to 2013M6. Whist there is a strong evidence of a diversification benefits and superior risk adjusted performance of Thai property sectors in mixed asset portfolio. We compare the performance of a stock portfolio (benchmark portfolio) and that of an optimal mixed portfolio comprising of stock and real estate (direct and indirect real estate) by using the Sharpe ratio to measure portfolio performance. We test whether there is a statistically significant difference between the benchmark portfolio and the mixed portfolio. From our study, the results show that investing in all types of real estate entail benefits for Thai investors in the sense that the mixed portfolio always shows better performance than the benchmark portfolio.*

**Keywords:** *real estate, portfolio, investment, asset allocation, Thailand*

**JEL:** *D31, E44,*

## Introduction

An investor could undertake to gain exposure to the real estate market was by either purchasing a tangible real estate, in other words stepping into the direct real estate market or buying the shares of real estate companies in the stock market. That is investors can invest in real estate either directly or indirectly real estate. Investment in direct real estate offers considerable advantages. For instance, it generates an attractive income stream (the house for renting) and possible long-term capital appreciation and particularly strong diversification benefits to stocks and bonds. Thus, there is extant literature showing that direct real estate has a significant place in the mixed-asset portfolio. Particularly, empirical studies, for example Seiler, Webb, and MYER (1999), suggest that housing investment not only generates risk-adjusted returns comparable to those on financial assets, but also provides low correlations with other asset classes. Moreover, direct real estate can even boost total portfolio returns (Byrne & Lee, 1995). Direct real estate, however, has considerable drawbacks too. For example, it is illiquid, high operation expenditure, vacancy, and also requires significant capital to build a diversified portfolio. As a consequence, investors have sought alternatives, such as publicly traded real estate securities, e.g. securitized real estate, in order to gain the advantages of private real estate investment without its disadvantages. Recent evidence suggests that there is a reluctance by a number of institutions to incorporate listed real estate into their real estate allocation (Baum & Moss, 2013).

This study will investigate if, and how, real estate can enhance and improve the risk-adjusted return within a mixed-asset portfolio. Also, this work will try to conclude whether there are differences within the asset class of real estate itself, between the two kind's direct real estate and indirect real estate. There are likely differences in terms of returns, risk, yields, and liquidities. Furthermore, this study will thereafter investigate which one of the two different real estate is the most preferable to include in a mixed-asset portfolio. Asset allocation in finance theory refers to the process of securing the most favorable return-risk trade off. This process relates to competing interests concerning with risk reduction and return enhancement at the portfolio level, subject to various constraints (Kritzman, 1992). The extent to which the asset allocation decision influences the performance of a portfolio has been widely discussed in the literature. For example, Brinson and Hood (1986) state that in the U.S. pension fund industry, strategic asset allocation is far more important than market timing and security selection. They claim that asset allocation can account for 93.6% of a portfolio's return. On the other hand, other studies argue that the contribution of asset allocation to a portfolio's performance may be trivial (e.g. Brinson and Hood (1986), Brinson, Singer, and Beebower (1991), Ibbotson and Kaplan (2000)). Though no consensus has been reached, there is little doubt that asset allocation is one of the major factors influencing the overall portfolio performance (Bekkers, Doeswijk, & Lam, 2009). In recent years, the relatively poor performance of traditional asset classes (e.g. stock or bond) has led investors to the search for alternative investment assets generating higher returns. In addition, in order to satisfy the desire to earn higher risk adjusted returns from using the asset allocation, investors tend to invest in assets which have a low or even negative correlation with traditional assets such as equities and bonds. These reasons have made real estate emerged as a major investment asset class compared to bonds and stocks (Giliberto, 1992).

Although the benefits of including either direct or indirect real estate in a portfolio comprising traditional financial assets have been widely studied for developed markets, this is not the case for a developing country like Thailand. A research on this topic is especially

interesting when real estate has increasingly become a popular investment of Thai people. Since 2000, the real estate market in Thailand has recovered and continued to show a strong performance. In this paper, we examine whether the performance of the traditional portfolio can be improved by adding real estate. Findings from this paper have valuable implications for investors who choose to allocate their portfolio to either a single asset (i.e. direct or indirect real estate) or a combination of assets (both direct and indirect real estate). To investigate the role of real estate in a mixed-asset portfolio, we apply the standard mean-variance approach to determine the weight (the relative importance) of real estate that maximizes portfolio returns for given risk levels. It should be noted that although the mean-variance optimization technique was developed to apply only for portfolios of individual stocks, its application has been extended to portfolios with various investment asset classes. Nowadays, the use of this technique for portfolio allocation to real estate has become increasingly popular (Yao & Hwa, 2008).

To investigate the benefits of including real estate assets in an investment portfolio, we compare the performance of a benchmark portfolio comprising of only traditional assets as equity and that of a mixed portfolio allocated to both traditional assets and real estate. The conventional wisdom suggests that direct real estate is an asset class with specific risk/return characteristics and a low correlation with traditional asset classes such as stock and bonds. Thus, adding direct real estate to an equity portfolio should improve the risk/return profile of the portfolio (Seiler, et al., 1999). We empirically test this belief in our paper. We therefore examine also another great interest for investors, i.e. the benefits of including indirect real estate assets in a portfolio of traditional assets. For direct real estate, we use two housing indices: single house (return of single houses) and town house (return of town houses). As for indirect real estate, real estate stock indices of two sectors are used: PROP (return on property development stock index) and CONMAT (return on construction material stock index). This study could serve as a guideline for investors whether including (in)direct real estate in an investment portfolio is worthwhile for the Thai investor. In the remainder of this study, first we provide an overview of the benefits of asset allocation including real estate investments. The paper continues with the literature survey in real estate asset allocation and a discussion of how the mean-variance can be combined to determine optimal portfolios. Finally, we close with some conclusions.

## **Literature survey in Real Estate Asset Allocation**

Real estate has been shown to enhance the mixed-asset portfolio returns, for example, Gordon and Canter (1999) and Maurer and Reiner (2002) showed that integrating indirect real estate (real estate stocks) into a portfolio leads to superior performance. In addition, Stephen L. Lee (2003) found that the inclusion of REITs in a mixed-asset portfolio can lead to increases or decreases in returns depending both on the asset classes in the portfolio, and the economic situation (prosperity or downturn). For the U.S. data over the period 1972M1-2001M12, Stephen L. Lee (2003) found that the substitution of REITs for bonds in a portfolio is generally detrimental to the portfolio performance, especially in periods of economic downturn. However, when substituting REITs for equities, especially large cap stocks, the portfolio does show a better performance in periods of financial stress. On the other hand, some empirical studies find that including REITs in a mixed-asset portfolio will diminish or even eliminate the benefits of asset allocation. For example, examining the effect of including EREITs into a portfolio of common

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stocks using monthly data over the period 1980-1985, Kuhle (1987) concluded that REITs do not add any significant increases in the portfolio performance in terms of risk-adjusted returns. These findings are corroborated by Gyourko and Nelling (1996) and Paladino and Mayo (1998).

Conventional wisdom in investment favors the inclusion of real estate in a portfolio consisting of financial assets such as stock, since it seems to have a low correlation with these traditional investments. Investing in real estate can be mainly implemented via either a direct way (owning a real property) or an indirect way (investing in securitized real estate). Direct real estate has shown to be a good diversifier for a financial investment portfolio. A large and growing body of literature has investigated the benefits of including (direct and indirect) real estate in a mixed-asset portfolio. Ross and Webb (1985), for example, is one of the first empirical studies examining the potential benefits of adding direct real estate to a mixed asset portfolio. Using the data for 14 countries from 1958 to 1979 by the United Nations (UN), they found that direct real estate can reduce a portfolio risk “better” than financial assets, and hereby offers a good diversification. As another supportive evidence, S.L. Lee (2010) also found that direct real estate provides the positive benefits to the alternative financial assets. The benefit of direct real estate mainly coming from its diversification benefits rather than any return enhancement. Nonetheless, the results also indicate that the benefits of real estate to the U.S. capital market portfolio can show substantial changes through time.

As for indirect real estate, using monthly data from 1972M1 to 2009M12 in the U.S., Stephen L Lee (2010) found that REITs offer diversification benefits for a mixed-asset portfolio with a number of asset classes. Especially, REITs were found to be a good diversifier for a stock dominated mixed asset portfolio. Nevertheless, indirect real estate has been found to be less effective than direct real estate in providing diversification benefits for a mixed-asset portfolio. For example, using quarterly data from 1990 to 2002 for the U.S. Georgiev, Gupta, and Kunkel (2003) investigated the potential diversification benefits when direct and indirect real estate are included in a portfolio. They found that while direct real estate investment is found to be a good diversifier for stocks and bonds, indirect real estate (proxied by real estate investment trusts (REITs)) was shown to be poor substitutes for direct real estate investments in playing such a role. The reason, according to Georgiev, et al. (2003), is that indirect real estate returns may already incorporate a significant component of the equity returns. In addition, Mull and Soenen (1997) found that the diversification benefits that real estate securities provide are time-varying. Particularly, Mueller, Pauley, and Morrill (1994) found that EREITs (Equity Real Estate Investment Trusts) were only a valuable addition to the mixed-asset portfolio for the period 1976-1980 and 1990-1993, but not for the period 1980-1990. The reason is that EREIT returns have been found to be highly positively correlated with the returns on common stocks but weakly positively related to bonds. Besides, the diversification benefits of indirect real estate tend to increase as the investment horizon is extended (S.L. Lee & Stevenson, 2005).

Not only the type of investment (direct versus indirect real estate), but also the choice of real estate sector to include in a mixed-asset portfolio may also have important implications. Some empirical studies, for example Pagliari, Webb, and Del Casino (1995) and Geurts and Nolan (1997) suggested that different real estate sectors (not only one) should be included together in mixed-asset portfolio to achieve a better performance. Yao and Hwa (2008) examines the role of Malaysian residential properties in Malaysian mixed asset portfolios for the 2000Q1-2006Q3 period. The results show that adding the Malaysian residential properties into a mixed asset portfolio leads to a decrease in risk and increase in risk-adjusted returns of the portfolio.

Nevertheless, this study found that indirect property investments failed to provide these benefits to mixed-asset portfolios comprising of Malaysian shares, bonds and direct residential properties.

Furthermore, Waggle and Johnson (2009) examined the impact of including timberland, farmland and commercial real estate in a mixed asset portfolio over 1928 to 2007 in the U.S. The findings for the use of timberland as an asset class are straightforward. Timberland, along with traditional commercial property, clearly has a place in the investment portfolios of institutional investors, even supplanting commercial property as the largest component of the real estate category's allocation. Timberland is shown to be a desirable choice for investors of virtually all risk tolerance levels, while farmland entered only low-risk portfolios. For the data between 1968 and 1994, Hardin and Cheng (2005) also showed that investment in the U.S. farmland does not improve the mixed-asset portfolio efficiency when real estate is already a component of the mixed-asset portfolio. In the case of timberland, Eves and Newell (2001) also found that the U.S. timberlands provide a significant risk reduction of a mixed-asset portfolio (portfolio diversification benefits) over the period of 1987-1999. Timberland was also found to make a significant contribution to a portfolio of stocks, bonds and real estate, particularly at the low-to-mid risk portfolio because of the low correlation with stocks and bonds. These results are supported by Caulfield (1998) and Newell and Eves (2009).

## Data

In this study, we use two real estate stock indices from the Thailand stock exchange (SET) to proxy for the indirect real estate assets. Specifically, the first one is the PROP index covering 64 listed companies in the property development sector over 1993M11-2013M6. The second one is the CONMAT index tracking the stock prices of 19 listed companies in the construction materials sector over 2001M1-2013M6. Data for PROP and CONMAT can be obtained directly from the SET website via the reporting tool "SETSMART". All three indices (SET, PROP and CONMAT) are constructed using market-value weights and are adjusted for dividends. For direct real estate, we measure real estate performance by considering two available housing indices, i.e. the index for single detached houses (SINGLE HOUSE) and the index for town houses (TOWN HOUSE) over 1993Q4-2011Q2. Both indices are provided only in quarterly frequency by Bank of Thailand. All returns are ordinary returns.

For stock (benchmark portfolio), we obtained the monthly data of stock market index of Thailand (SET index) covering the periods from 1993M11 to 2013M6, which is collected from Datastream.

The rate of return of a risk-free asset, generally known as the risk-free rate, is important for most investors because it is often used as a benchmark to measure the return of the other financial assets. However, investors will ask for a higher return as they take on more risk (relative to a risk-free asset). In practice, short-term government securities (such as treasury bills) are commonly used as risk-free assets because they generate a fixed return and have an exceptionally low default risk. Since the available time series for both 1-month and 3-month T-bill rates are rather short in Thailand (only from 2001M2 to 2013M6 (149 observations)), we estimate the T-bill rates for the period between 1993M11 and 2001M1. Checking the correlation between the T-bill rates and interbank rates, we find that the correlation coefficient between those two is highly positive (0.97) and significant at 1%. Hence, we extract information

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contained in the interbank rates to estimate the T-bill rate

Table 1. Summary statistics and correlation matrix for risk-free assets with fitted value of T-Bill

This table reports the descriptive statistics for *TBill*, *IB* and *TBill fitted*. *TBill* denotes treasury bill returns and *IB* is interbank rate returns. This table presents the mean, standard deviation, minimum, and maximum in the monthly data. *TBill fitted* is calculated by regression interbank rate returns on treasury bill rate returns ( $IB\ rate_t = \alpha + TBill_t + \varepsilon_t$ ). Correlation matrix shows in the right hand side of the table.

Variable	<i>N</i>	Mean	Std.	Min	Max	Correlation		
						<i>TBill</i>	<i>IB</i>	<i>TBill fitted</i>
<i>TBill</i> (%)	149	0.20	0.09	0.08	0.41	<i>TBill Rate</i>	1	
<i>IB</i> (%)	236	0.42	0.36	0.10	1.83	<i>IB Rate</i>	0.97	1
<i>TBill fitted</i> (%)	236	0.38	0.33	0.08	1.67	<i>TBill fitted</i>	0.99	0.97 1

## Theoretical Framework

### *Theory of Portfolio Optimization*

We followed the traditional mean variance (MV) framework introduced by H. Markowitz (1952) to determine the optimal portfolios. Modern portfolio theory (MPT) is typically applied to determine efficient allocations and investment strategies for investors. A Markowitz theory is based on the following assumptions. First, the expected return and risk measured by the mean and variance of the returns on the asset are the fundamental drivers of the investors' decisions. Second, all investors have the same investment horizon. The third assumption is that financial assets are arbitrarily fungible. The last but not least, information is freely and simultaneously available to all investors (West, 2004 ).

The investor always has to choose the trade-off between risk and expected return when constructing a portfolio in such a way that the return is highest with same degree of risk. The Markowitz model is highly sensitive to its data inputs, which leads to large fluctuations in the proportion of assets in the optimal portfolio. H. Markowitz (1952) proposed that investors select portfolios based on the portfolio's overall risk-reward characteristics as a whole, not the attractive risk-reward characteristics of each individual security in the portfolio. Any efficient portfolio is a combination of a number of assets. Let us first take a look at an efficient portfolio with only two risky assets ( $i, j$ ) as an illustration for the calculation of expected returns and variance (risks) of an portfolio with  $n$  assets. The expected return of this investment portfolio is the weighted sum of the expected returns of two assets. The weights are simply the respective portfolio weights. We can present the formula to calculate the expected returns of this portfolio as follows

$$E(r_p) = w_i E(r_i) + w_j E(r_j), \quad (2)$$

where  $E(r_p)$  is the expected return,  $w_i$  and  $w_j$  are the weights of asset  $i$  and  $j$  in the portfolio.

In the framework of the Markowitz model, investors only need the expected return, the standard deviation and the covariance of the assets to make their decision. The central idea is how to mix two or more assets at proportions in a portfolio so that the expected return on this portfolio is highest for a given level of risk. In the framework by Markowitz, the risk of a portfolio's returns is proxied by the variance of the portfolio which in turn depends on the return variances and covariances of individual assets included in this portfolio. Intuitively, the approach by Markowitz does make sense since investors would want their investments to generate a high average return with a variance being as little as possible. The variance of portfolio returns can be calculated from the variance of assets and the covariance between them as

$$Var(r_p) = \sigma_p^2 = w_i^2 \sigma_i^2 + w_j^2 \sigma_j^2 + 2w_i w_j Cov(r_i, r_j), \quad (3)$$

where risk as measured by the standard deviation,  $\sigma$  or  $\sigma_p^2$ , the variance,  $Var(r_p)$  or,  $Cov(r_i, r_j)$  is the covariance between the returns of asset  $i$  and asset  $j$ .

It should be noticed that this expression can be written as a function of the variances of the asset returns and the correlation between them:

$$\sigma_p^2 = w_i^2 \sigma_i^2 + w_j^2 \sigma_j^2 + 2w_i w_j \rho_{ij} \sigma_i \sigma_j. \quad (4)$$

where  $\rho_{ij}$  is the correlation coefficient of the returns of asset  $i$  and  $j$ ,  $\sigma_i$ ,  $\sigma_j$  is the standard deviation of the returns of asset  $i$  and asset  $j$ .

As we mentioned before, efficient portfolios can be constructed by combining between any number of asset. In this part, we will show the general formulas to calculate the expected return and variance for an  $n$  –asset portfolio. Particularly, the portfolio's expected return is simply the weighted average of expected returns of  $n$  assets in the portfolio:

$$E(r_p) = \sum_{i=1}^n w_i E(r_i). \quad (5)$$

Alternatively, written in matrix form as:

$$E(r_p) = W^T R, \quad (6)$$

where  $W = \begin{pmatrix} w_1 \\ \vdots \\ w_n \end{pmatrix}$  is the vector of weights for each asset in a portfolio,  $R = \begin{pmatrix} E(r_1) \\ \vdots \\ E(r_n) \end{pmatrix}$  is the vector of expected asset returns.

The variance of the  $n$  –asset portfolio can be derived as follows:

$$Var[E(r_p)] = \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_{ij}, \quad (7)$$

where  $V$  is the variance-covariance matrix of asset returns:

$$V = \begin{pmatrix} \sigma_{11} & \cdots & \sigma_{1n} \\ \vdots & \ddots & \vdots \\ \sigma_{n1} & \cdots & \sigma_{nn} \end{pmatrix}. \quad (8)$$

$V$  is a symmetric matrix because

$$\sigma_{ij} = \sigma_{ji}.$$

Thus, the variance of the portfolio can be shown as follows:

$$Var[E(r_p)] = (w_1 \dots w_n) \begin{pmatrix} \sigma_{11} & \cdots & \sigma_{1n} \\ \vdots & \ddots & \vdots \\ \sigma_{n1} & \cdots & \sigma_{nn} \end{pmatrix} \begin{pmatrix} w_1 \\ \vdots \\ w_n \end{pmatrix} = W^T V W, \quad (9)$$

#### *Assumption on Preferences and Asset Returns*

The Sharpe ratio is a type of risk-adjusted performance measurement, since it calibrates the average return of an asset relative to the corresponding volatility of the asset returns over a particular time period. In contrast to the Jensen's alpha or the Treynor ratio, the Sharpe ratio accounts for not only the systematic but also the non-systematic risk. The Sharpe ratio, also called the “reward-to-variability ratio”, is the mean excess return per unit of the total risk, as measured by standard deviation of excess returns. Sharpe (1994) proposes several examples where choosing the best portfolio to invest in (in terms of maximizing the return on investor's assets) is equivalent to choosing the portfolio with the highest reward to risk ratio. This is

because the maximizing of the Sharpe ratio gives us a portfolio with the highest risk reward trade-off. The Sharpe ratio is usually used to evaluate the financial asset performance.

The use of the Sharpe ratio as a quantitative tool is now commonly found in many different areas in Finance and Economics, from the evaluation of portfolio performance to market efficiency tests (see, for example, Levy (1972); Cumby (1990); Grinblatt (1994); Ofek (2003); Agarwal (2004)). The Sharpe ratio of the portfolio that combines risky assets and a risk-free asset can be presented as:

$$\text{Sharpe Ratio} = \frac{E(r_p) - r_f}{\sigma_p}, \quad (10)$$

where  $r_f$  is the risk free return which in practice is often proxied by the return of 3-month Treasury bill.

Although widely applied in the asset allocation, the Sharpe ratio has been claimed to be not a good measurement for portfolio performance. For example, we note that to calculate the Sharpe ratio the excess returns are assumed to be serially independent and identically normal-distributed (see, for example, Jobson and Korkie (1981) and Memmel (2003)). However, in reality, the assumption of normality may be violated. For example, E.F. Fama (1965) analyzed the empirical data and concluded that the distribution of a security or portfolio returns is not normal, but “fat-tailed” instead.

We know that the theoretical frameworks with respect to portfolio optimization are the Markowitz theory and the Expected Utility theory so that we may support Markowitz’ argument if we can show that the individual’s expected utility depends only on the mean and standard deviation of the portfolio return. That is can be achieved by focusing on the form of the utility function or on the distribution of asset returns. As mentioned by Pennacchi (2008), if the utility function is quadratic, the expected utility depends only on mean and variance of portfolio returns. That is the derivatives of third order or higher are equal to zero if utility function is quadratic. We can define the individual’s expected utility as follow:

$$E[U(R_p)] = UE(r_p) + \frac{1}{2}E\left[\left(R_p - E(r_p)\right)^2\right]U''(r_p) \quad (11)$$

$$= UE(r_p) + \frac{1}{2}V(R_p)U''(r_p) \quad (12)$$

where  $V(R_p)$  is the variance of the portfolio return,  $U''$  denote the second derivative of the utility function.

Alternatively, when returns are multivariate normally distributed, the expected utility also only depends on the mean and the variance of the portfolio. If asset returns only moderately depart from normality, it remains appropriate to utilize the mean-variance framework for asset allocation. As shown in our statistical results all asset returns we are concerned also not large deviations from normality. Moreover the data we use are in monthly data also emphasizing this argument. Finally, as shown by Levy and Markowitz (1979) and H. M. Markowitz (1987) mean-variance optimization provides a good approximation of optimal portfolios for broad families of utility functions.

## Methodology

### *Optimal Investment Portfolios with Short Sales Allowed*

The possible combination of risky assets, without including any holdings of the *risk-free asset*, can be plotted in the *standard deviation space*, and the collection of all such possible portfolios defines a region in this space. The upward-sloped (positively-sloped) part of the left boundary of this region, a *hyperbola*, is then called the efficient frontier. In other words, the efficient frontier is the portion of the opportunity set that offers the highest expected return for a given level of risk, and lies at the top of the opportunity set or the feasible set. A combination of assets lying on the efficient frontier is referred to as “an efficient portfolio”. The efficient frontier is used by investors as a guideline to select their portfolios. The efficient frontier line starts with the-lowest-risk-and-return portfolio and moves upward to the higher-risk-and-return ones, of which investors will choose the one that suits their risk preferences. Hence, people with different degrees of risk tolerance<sup>1</sup> can find an appropriate portfolio anywhere along the line. For example, risk-averse investors<sup>2</sup> will prefer efficient portfolios with low risk level (close to the origin), whereas less risk-averse investors,<sup>3</sup> will accept a higher risk level (i.e., they will pick efficient portfolios further away from the origin)(H. Markowitz, 1959).

In investment analysis, we use the Sharpe ratio to rank the risk-return performances of assets in the portfolio. The portfolio with a maximum Sharpe ratio gives the highest expected return per unit of risk (or the highest possible mean-standard deviation ratio), which can be considered as the most “risk-efficient” portfolio (Sharpe, 1992 ). It is common practice in investment theory that investors use the Sharpe ratio as a criterion to select portfolio. Particularly, once a particular investment portfolio is constructed or identified, investors will compare its relative returns reward to risk (volatility) to that of an alternative portfolio. For example, investors may test if the inclusion of an additional asset class permits a statistically significant improvement in the portfolio’s returns reward to risk (volatility). In other words, investors may like to perform a statistical test for the difference between the Sharpe ratios of these portfolios. Gibbons, Ross, and Shanken (1989) developed an F-distributed test statistic to implement this type of test, which is usually referred to as GRS test. Following the literature, our testing strategy in this paper is implemented as follows. Firstly, we test whether the Sharpe ratio of the benchmark portfolio is significantly different from that of our portfolio of interest (or the portfolio that we want to test). We define the Sharpe ratio as in equation (9). The GRS test derived by Gibbons, Ross, and Shanken (1989) is calculated as

$$W_u = \frac{\hat{\varphi}_T^2 - \hat{\varphi}_P^2}{1 + \hat{\varphi}_P^2}, \quad (13)$$

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1 Risk tolerance is defined as the level of risk that an investor is disposed to bear. This characteristic is unique for each individual investor.

2 Investors with a low risk tolerance or an investor who when faced with two investments with a similar expected return, but different risks, will prefer the one with the lower risk.

3 Less risk-averse investors adjust their expected returns upwards when risk is present.

where  $\hat{\varphi}_T$  denotes the *ex post* Sharpe ratio of the tangent portfolio, and  $\hat{\varphi}_p$  is the *ex post* Sharpe ratio of the portfolio of interest. The null hypothesis is that both *ex ante* Sharpe ratios are equal ( $\varphi_T = \varphi_P$ ).

The GRS (1989) test has been shown to perform well in the framework of mean-variance efficiency using the finite-distribution approach (Affleck-Graves & McDonald, 1989). Gibbons, et al. (1989) show that the distribution of  $kW_u$  follows  $F(n, T - n - 1)$ , where  $n$  refers to the number of investment opportunities available,  $T$  is the number of observations, and the parameter  $k$  is defined as  $= \frac{T(T-n-1)}{n(T-2)}$ .

The F-value of the test defined by Gibbons, Ross, and Shanken (1989) has the following form:

$$F = kW_u, \quad (14)$$

or

$$F = \frac{T(T-n-1)}{n(T-2)} \times \frac{\hat{\varphi}_T^2 - \hat{\varphi}_P^2}{1 + \hat{\varphi}_P^2}. \quad (15)$$

It is worth mentioning here that the assumption that all financial asset returns are multivariate normal is critical in the statistical analyses for the GRS test. However, since this assumption may not always hold, statistical tests relying on this assumption may fail to give correct results. In such a case, the bootstrap method relaxing this assumption may provide more reliable results. Bootstrapping is a nonparametric approach that relies on the assumption that the current sample is able to represent the population. This approach is based on the same theory underlying the Monte Carlo simulation method, except that its resampling is from the original data of the population rather than from an assumed population. There are a few applications of the bootstrap method and simulation as a way to reduce the problems of non-normality in the mean-variance efficiency test. As an example, using a simulation technique, Affleck-Graves and McDonald (1989) tested the robustness of the GRS test to the non-normality in the residual covariance matrix. They concluded that the multivariate GRS test is robust with respect to typical levels of non-normality. In other words, the GRS test is reasonably robust to minor departures from normality. Other examples are from Zhou (1993) and Chou and Zhou (2006). Zhou (1993) proposes a procedure to approximate the p-values for GRS-statistic by using simulation, while Chou and Zhou (2006) suggested the use of the bootstrap method when the error distributions are not specified for testing the well-known Eugene F Fama and French (1993) model.

Secondly, we use the test derived by Jobson and Korkie (1981), denoted as JK in the sequel. Jobson and Korkie (1981) developed a pairwise and multivariate test for Sharpe ratio equality, in which the portfolios' excess returns are assumed to be well modeled by a multivariate normal distribution. This pairwise test is latter corrected by Memmel (2003). Although Jobson and Korkie (1981) agree that the test may be conducted using the sample difference ( $\hat{\varphi}_i - \hat{\varphi}_j$ ), they further state that the use of transformed difference  $\hat{S}_{ij}$  may result in a marginal improvement over the ordinary difference in small samples.  $\hat{S}_{ij}$  is defined as

$$\hat{S}_{ij} = \hat{\sigma}_j \hat{\mu}_i - \hat{\sigma}_i \hat{\mu}_j, \quad (16)$$

where  $\hat{\mu}_i$  is the *ex post* excess return on portfolio  $i$ , and  $\hat{\sigma}_i$  refers to its *ex post* standard deviation. The statistically significant difference in the Sharpe performance of any two portfolios can then be tested using a Z-statistic as

$$Z_{ij} = \frac{s_{ij}}{\sqrt{v_{ij}}}, \quad (17)$$

or

$$Z_{ij} = \frac{\hat{\sigma}_j \hat{\mu}_i - \hat{\sigma}_i \hat{\mu}_j}{\sqrt{v_{ij}}}, \quad (18)$$

which follows the standard normal distribution with the asymptotic variance corrected by Memmel (2003);

$$v_{ij} = \frac{1}{T} \left[ 2\hat{\sigma}_i^2 \hat{\sigma}_j^2 - 2\hat{\sigma}_i \hat{\sigma}_j \hat{\sigma}_{ij} + \frac{1}{2} \hat{\mu}_i^2 \hat{\sigma}_j^2 + \frac{1}{2} \hat{\mu}_j^2 \hat{\sigma}_i^2 - \frac{\hat{\mu}_i \hat{\mu}_j}{\hat{\sigma}_i \hat{\sigma}_j} \hat{\sigma}_{ij}^2 \right], \quad (18)$$

where  $\hat{\sigma}_{ij}$  is the ex post covariance between the excess returns of portfolios  $i$  and  $j$ .

Jobson and Korkie (1981) show that the Z-statistic is approximately normally distributed with a zero mean and a unit standard deviation for large samples. A significant Z-statistic rejects the null hypothesis of equal risk-adjusted performance and suggests that one of the investment portfolios outperforms the other. Note that the statistical power of the test is low: at the 5 percent significance level, it fails to reject a false null hypothesis 85 percent of time (Jorion, 1992). Thus, there is a strong evidence for a difference in risk-adjusted performance whenever observing a statistically significant of Z score.

#### *Optimal Investment Portfolios When Short Sales Are Not Allowed*

We now turn to look for the optimal investment portfolio when short sales are not allowed or whenever an investor sells a security that (s)he does not own in order to make profits from a falling market (s)he is involved in short-selling. For the Thai investors short sales are not allowed is more relevant since short sales are not allowed in the Thai capital markets. Short-selling activity is highly popular in many countries, however, short sales are not always allowed (Bris, Goetzmann, & Zhu, 2003; Bris, Goetzmann, & Zhu, 2007). For instance, short sales are not allowed in the Thai capital market but are permitted in the US financial market. Hence, whether or not this constraint should be imposed in the portfolio optimization process is dependent on the actual situation of the countries.

The constraint when the short-selling is prohibited is that the portfolio weights cannot be negative and requires a quadratic programming algorithm. In such a case, the critical line algorithm provides a practical way of reaching efficient portfolios (H. Markowitz, 1956, 1959). The other restriction we should mention here is that investors cannot short sell real estate thus it might not be appropriate to apply the model directly to real estate markets without modifications. However, it can be argued that although investors cannot short sell real estate directly, they can short sell real estate stocks (indirect real estate). Since real estate companies hold real properties, investors should be able to construct portfolios of real estate stocks that mimic the movements of particular real estate markets.

To test the equality of any two portfolios' Sharpe ratios we use the JK test statistic as described in the previous section and we also test the null hypothesis that the interested portfolio is *ex ante* efficient by using the Monte Carlo simulation. Instead of using the sampled historical

data, the Monte Carlo method uses a stochastic process to simulate outcomes which may occur in the future. This approach requires additional analyses of the return patterns in order to choose the stochastic process that best fits the data, in order to make the simulation as realistic as possible. The simulation process proceeds as follows. First, we compute the *ex post* covariance matrix and mean return vector from the historical returns (actual sample). Then the optimization is implemented subject to the objective function and investor constraints. Assuming that the estimated parameters (from the previous step) are the true values, i.e., the *ex-ante* parameters, we randomly draw normally distributed samples from those parameters (random samples of the number of assets joint returns ( $n$ )) in the second step. Every sample represents one month of simulated returns. We repeat the sampling  $T$  times. These new simulated datasets of means and variance-covariance matrix are used to estimate the efficient frontier. Lastly, we then repeat this procedure until the distribution of optimal portfolios is approximated with enough precision. In this paper, we use one thousand replications<sup>4</sup> yielding an empirical distribution for our test statistic. The percentiles of this distribution can be used to determine whether the efficiency of property index is rejected or not.

## Summary Statistics and Empirical results

A drawback for emerging country is the data scarcity. Similarly as our case, the study of asset allocation among 5 assets; STOCK, PROP, CONMAT, SINGLE HOUSE and TOWN HOUSE in Thailand are consist of the different length in histories returns. As we can see from **Fehler! Verweisquelle konnte nicht gefunden werden.**, there is a rich history return of STOCK and PROP going back to 1987, which cover the Asian financial crisis in 1997 while CONMAT start since 2000. Moreover, the data of two housing return, SING and TOWN are available until 2011Q1. It means that, if we use only the available data, the time period which we can study for these five assets can run only from 2000Q2 to 2011Q1. Several standard portfolio risk analysis, e.g. covariance matrix, bootstrapping simulations or regime dependent risk analysis, require the full return histories for all assets class in the portfolio (Page, 2013). However, in many studies, we find that the lengths of available histories differ across the assets. Most of the time, the analyst discard the useful data because the returns are not far back in the history as same as the other assets in the portfolios. It is not appropriate to exclude the shorter history asset return because in general they not only provide additional information about the longer history assets, but they also provide useful information about itself (Stambaugh, 1997).

This part of the paper, we try to overcome this problem by combining data with different length histories for investments. We use the combinations between bootstrapping and maximum likelihood estimation model. While, the Bootstrapping method uses data from *ex post* data, the Monte Carlo simulation examines data from a theoretical normal distribution. The model we use may improve the problem of non-normal distributions. This model uses the betas between assets to fill in missing value. The model samples residual from the short data in this paper generate the uncertainty around the backfilled returns. These residuals are calculated from the difference between expected returns in the short sample and the observed long sample. To sample the residuals from the short sample, we can follow these steps. First, calculate the different between

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<sup>4</sup> We also check the consistency of the results by performing 500, 1,000 and 2,000 simulations.

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the long sample returns and the quasi maximum likelihood returns at each point in time in the short sample. Second, randomly select one of these residuals. Third, calculate the implied return for the current period by adding this residual to the quasi-maximum likelihood. Fourth, repeat the second and the third step several times for each data which need to backfilled.

Hence, we first regress the returns for CONMAT on the returns for SET and PROP in period 2000Q2- 2013Q2 as follow:

$$R_{CONMAT} = \alpha_1 + \beta_1 R_{SET} + \gamma_1 R_{PROP} + \varepsilon_t, \quad (19)$$

where  $\alpha$  is a constant,  $\beta$  is a coefficient,  $\varepsilon_t$  is the error term,  $R_{CONMAT}$  is the return for CONMAT,  $R_{SET}$  is the return for stock and  $R_{PROP}$  is the return for PROP.

We follow the same procedure with the other assets, SING and TOWN, as follows:

$$R_{SING} = \alpha_2 + \beta_2 R_{SET} + \gamma_2 R_{PROP} + \varepsilon_t, \quad (20)$$

$$R_{TOWN} = \alpha_3 + \beta_3 R_{SET} + \gamma_3 R_{PROP} + \varepsilon_t, \quad (21)$$

where  $R_{SING}$  is the return for single house,  $R_{TOWN}$  is return for town house.

Table 2. Summary result for combining short time-series data

The table reports the regression results of CONMAT returns, SING returns and TOWN return on both SET returns and PROP returns ( $R_i = \alpha_i + \beta_i R_{SET} + \gamma_i R_{PROP} + \varepsilon_t$ ). In the table R denotes the return on assets.  $N$  is the number of observations,  $\bar{R}^2$  is the adjusted R-squared,  $F$  is the F-test.

	$\alpha$	$\beta$	$\gamma$	$N$	$\bar{R}^2$	$F$
$R_{CONMAT}$	0.0056	0.8261	0.2891	53	0.7154	66.36
$R_{SING}$	0.0045	0.0334	-0.0693	69	0.1110	5.25
$R_{TOWN}$	0.0049	-0.0028	-0.0557	69	0.1757	8.25

### Combine Long and Short Return Histories

Table 3 and

Table 4 present the quarterly summary statistics and correlation matrix for all five assets. Among these five asset categories, the 2.45% average quarterly return of CONMAT is the highest, but PROP has the highest standard deviation of 29.89%. Likewise the average return on SING and TOWN are equal at 0.45% which lowers than the T-Bill return. Not surprisingly, STOCK has a highly positive correlation with both PROP (0.83) and CONMAT (0.92), even though the relationship between STOCK and both SING and TOWN are negative (-0.27, -0.38, respectively). The negative correlation indicates that including real estate as an asset class can increase the portfolio diversification benefits of the standard financial assets such as stock. These results correspond with those of Fugazza, M. Guidolin, and Nicodano (2009).

Table 3. Summary statistics for the quarterly returns of assets

This table reports the descriptive statistics; mean, median, standard deviation, skewness, kurtosis, minimum, and maximum for all assets. The asset classes considered are direct real estate; *SINGLE HOUSE* is the returns on single house index, *TOWN HOUSE* is the returns on town house. Indirect real estate; *PROP* is the returns on property development stock index; *CONMAT* is the returns on construction material index. *STOCK* (returns on stock market) is the representative for financial asset. The measures are based on quarterly data. All returns are calculated by ordinary return. *N* is the number of observations.

	Mean	Median	Min	Max	Std	Skewness	Kurtosis	<i>N</i>
<i>STOCK</i> (%)	1.18	0.94	-41.77	48.23	16.64	0.24	3.48	78
<i>PROP</i> (%)	1.42	-1.30	-62.16	144.39	29.89	1.59	9.03	78
<i>CONMAT</i> (%)	2.45	0.50	-48.52	63.40	21.51	0.52	3.60	78
<i>SINGLE HOUSE</i> (%)	0.45	0.75	-20.75	22.07	4.33	-0.15	16.48	78
<i>TOWN HOUSE</i> (%)	0.45	0.60	-19.52	19.78	3.74	-0.30	20.44	78
<i>TBill</i> (%)	1.14	0.77	0.26	4.91	0.99	1.67	5.49	78

Table 4. Correlation matrix between asset classes

	<i>STOCK</i>	<i>PROP</i>	<i>CONMAT</i>	<i>SINGLE HOUSE</i>	<i>TOWN HOUSE</i>
<i>STOCK</i>	1				
<i>PROP</i>	0.83	1			
<i>CONMAT</i>	0.92	0.80	1		
<i>SINGLE HOUSE</i>	-0.27	-0.36	-0.29	1	
<i>TOWN HOUSE</i>	-0.38	-0.45	-0.39	0.91	1

Table 5 reports the summary results for all assets after combining different time lengths. Panel A shows the result for the full period (1994Q1-2013Q2). We find that TOWN has the highest Sharpe ratio (0.12) even though the Sharpe ratio among CONMAT (0.11), SING (0.10) and TOWN are not much different. PROP has the lowest Sharpe ratio (0.05). It shows the benefit of adding an alternative assets into the traditional portfolio as STOCK as we can see from the higher Sharpe ratio of the optimal portfolio (0.21). Although the Sharpe ratio of the optimal portfolio with no short sale allowed is nearly identical to the Sharpe ratio when short sales are allowed, the composition for the optimal portfolio is different. The case of no short sale allowed, investors should invest in only two assets that is TOWN 85.53% and CONMAT 14.47%.

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Table 5. The summary results of portfolios and test of efficiency

This table reports summary results for expected return, standard deviation and Sharpe ratio of portfolio for all five assets classes. For financial asset, *STOCK* is the return on stock, for indirect real estate; *PROP* is the return on property development index, *CONMAT* is the return on construction material index and for direct real estate, *SH* is the return on single house before doing de-smooth; *TH* is the return on town house before doing de-smooth. All measures are based on quarterly data.

	STOCK	PROP	CONMAT	SH	TH	Portfolio	
						Short Sales	No short
<i>Expected Return (%)</i>	1.18	1.42	2.45	0.45	0.45	0.9	0.74
<i>S.D. (%)</i>	16.64	29.89	21.51	4.33	3.74	4.38	3.49
<i>Sharpe ratio</i>	0.07	0.05	0.11	0.1	0.12	0.205	0.212

The diversification benefits in

Table 6 when adding the five assets together can be seen from the relatively higher Sharpe ratio of the optimal mixed portfolio (when short sale allowed: 0.75 and no short sale allowed: 0.73) than that of the single-asset portfolio. Furthermore, the GRS test in

Table 7. The summary results of portfolios and test of efficiency

does not show any significant difference between the Sharpe ratio of optimal portfolio and benchmark portfolio when both short sales allowed and without short sale. These results indicate that the performances of these two portfolios are statistically indistinguishable. In contrast, the JK-test shows that the optimal mixed portfolio significantly outperforms the benchmark portfolio at the 5% significant level for both cases (short sales allowed and short sales constraint).

Table 6. The summary results of portfolios and test of efficiency

for the wholeperiod (1994Q1-2013Q2)

This table reports summary results of portfolio and test of efficiency for all five assets classes. For financial asset, *STOCK* is the return on stock, for indirect real estate; *PROP* is the return on property development index, *CONMAT* is the return on construction material index and for direct real estate, *SH* is the return on single house before doing de-smooth; *TH* is the return on town house before doing de-smooth. All measures are based on quarterly data. In the table, *Wi* is the proportion in the optimal portfolio. The risk-free rate is T-bill rate at 0.00%. We compare the portfolios between with and without short sales. P-values are reported in the parentheses below the coefficients. (\*\*\*), (\*\*) and (\*) indicate significance at the 1%, 5% and 10% levels, respectively

	STOCK	PROP	CONMAT	SH	TH	Portfolio	
						Short Sales	No short
Portfolio (Wi)							
Short Sales (%)	-17.62	-0.62	28.67	-48.09	137.65	100	
No short Sales (%)	0	0	14.47	0	85.53		100

## DO THAI REAL ESTATE ADD VALUE TO INVESTMENT PORTFOLIO

Table 7. The summary results of portfolios and test of efficiency

This table reports summary results of portfolio and test of efficiency for all five assets classes. For financial asset, *STOCK* is the return on stock, for indirect real estate; *PROP* is the return on property development index, *CONMAT* is the return on construction material index and for direct real estate, *SH* is the return on single house before doing de-smooth; *TH* is the return on town house before doing de-smooth. All measures are based on quarterly data. We use JK is Jobson and Korkie test (JK-test) and the Gibbons, Ross and Shanken test (GRS-test) to test the efficiency of optimal portfolio. The hypothesis is  $H_0: \theta_T = \theta_P$ , where  $\theta_T$  denotes Sharpe of the tangent portfolio and  $\theta_P$  denotes the Sharpe ratio of the portfolio whose efficiency has to be tested. JK-test used to test statistical differences between Sharpe ratios of two portfolios. The risk-free rate is T-bill rate at 0.00%. We compare the portfolios between with and without short sales. P-values are reported in the parentheses below the coefficients. (\*\*\*), (\*\*) and (\*) indicate significance at the 1%, 5% and 10% levels, respectively

GRS (F-test)		JK (Z-test)	
<i>Short Sales</i>	0.55	<i>Short Sales</i>	1.05
(P-value)	-0.74	(P-value)	-0.15
GRS (F-test)		JK (Z-test)	
<i>No Short Sales</i>	0.60	<i>No Short Sales</i>	1.23
(P-value)	(0.70)	(P-value)	(0.11)

## Conclusion

Due to the uncertainty of financial markets, it is shown that alternative investment assets (such as real estate) may add value to a portfolio of traditional assets (such as stocks and bonds). Thus, we compare the performance of a benchmark portfolio (stock portfolio) and that of an optimal mixed portfolio of stock and real estate (i.e. single house (SING), town house (TOWN), property development stock (PROP) and construction material stock (CONMAT)) from a Thai perspective. In this study, we apply the mean-variance portfolio optimization, which is the foundation of the modern portfolio theory and is the most cited method in the asset allocation literature. To measure the performance of portfolios, we use the Sharpe ratio as a criterion (defined as the ratio of the expected return of the portfolio to its standard deviation). The standard deviation of a portfolio's returns, in the Sharpe framework, reflects the risk of the portfolio. In addition, according to the Sharpe rule, a portfolio performs better than another one if its Sharpe ratio is higher. A fall in risks or a rise in returns of a portfolio leads to an increase in its Sharpe ratio. We compare the performance of the benchmark portfolio and the mixed portfolio by testing the statistically significant difference between the two portfolios' Sharpe ratios. Following the literature, two tests are employed: Z test by Jobson and Korkie (1981) and F test by Gibbons, et al. (1989). Our findings show that in all cases the inclusion of property leads to a reduction in the risk of the mixed optimal portfolio compared to the benchmark portfolio. In general, the results show that it would be well wise for Thai investors to add some real estate investments to their traditional portfolio (of only traditional assets such as stocks). By doing that, they can enhance their portfolio performance due to the higher average return of real estate and also the low correlation between real estate and traditional investment assets.

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## AGRICULTURAL CREDIT AND EMISSION CERTIFICATION OPPORTUNITIES: A SILVER BULLET?

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**Abstract: Purpose:** *Formal credit to smallholder farmers is connected to social capital, common pool resources and more recently linked to environmental resource management. However, lending and investment by formal financial institutions to (smallholder) farmers in rural sub-Saharan Africa is limited due to information asymmetry and lack of collateral. On the contrary, smallholder ecosystem services and emission market participation in certain region is on the increase. Do farmers with payment for ecosystem services (PES) have favorable interest rate?*

**Methodology:** *Using a game theoretic and ordinary least square (OLS) regression, this paper investigates the impact of conservation agriculture value chain harnessing emission market mechanisms on the interest rate of (smallholders) farmers.*

**Result:** *The difference in interest rate between a conventional and conservation smallholder farmer (those with PES who also keep records) with similar characteristics to can be as high as 5%. This result should be interpreted with caution given that participation in ecosystem services and emission market may not be solely responsible for record keeping as well as the effects of reverse causality.*

**Keywords:** *financial institutions, carbon credit, smallholders, agricultural credit, interest rate*

**JEL codes:** *D2, D8, G2, Q1, Q2*

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## Introduction

In parts of sub-Saharan Africa, agricultural small medium enterprises (SMEs) are confronted with a number of challenges; most notable of them are climate change and credit constraints. Both factors are to some extent interrelated as uncertainty of business returns due to climatic conditions may negatively impacts business financing. This business uncertainty further compounds the issues of information asymmetry in rural agricultural SMEs, which is perceived as a major obstacle to gaining access to credit as banks are not able to identify or anticipate businesses which are a bound to succeed in the future. Information asymmetry has often leads to adverse selection and issues of collateral requirement and credit rationing, while rationing is also used by formal financial institutions to control excess demand for credit by borrowers (Besanko and Thakor, 1987; Swinnen and Gow, 1999; Stiglitz and Weiss, 1981; Wette, 1983). The limited amount of lending by formal financial institutions to the rural agricultural SMEs in developing countries can be attributed to this market imperfection (Sacerdoti, 2005; IFAD 2003; IFC, 2013).

One strategy which has the potential to help overcome the aforementioned market imperfection is extension services with ecosystem services. This strategy employing these types of services not only improves farmers' human capital (climate adaptation, record-keeping) but also introduces carbon (CO<sub>2</sub>) certification and payment for ecosystem services (PES) (climate mitigation) (Tham-Agyekum et al., 2010; Evenson, R.E. and G. Mwabu, 1998; Pagiola et al., 2008). Climate adaptation training via extension services has led to improvements in farming revenue and record keeping amongst adopting farmers (Kagwiria, 2013). The revenue generated from PES is to a large extent diversifying on-farm business, CO<sub>2</sub> mitigated by farmers (e.g. tree planting) thus increases farming revenue. Moreover the carbon registration process may be a catalyst for information gathering. This is in line with studies which argue that ecosystem and conservation farming by smallholders in developing countries contributes to the alleviation of poverty by helping farmers accumulate capital (Pretty, 1999; Pagiola et al., 2005; Thierfelder et al., 2012; Havemann and Muccione, 2011; Montagnini and Nair, 2004). The high incomes and increased symmetry of information that result from smallholder adoption of these special farming practices may eventually decrease risk premiums charged by financial institutions since banks may be willing to accept future income as an adequate substitute for collateral.

Property rights may be a mechanism for poverty alleviation through increased physical and human capital investment from a generational point of view as well as government backed financial scheme, it however does not necessarily lead to improved access to formal sector credit (Galiani and Schargrodsky 2010; Field and Torero, 2003). Informal lenders use tenure status as a screening device rather than as form of security in Uganda, where smallholder farmers without title had better access to this form of credit (Petracco and Pender, 2009). Land tenure significantly influence farmers' decisions to invest in land improvement and conservation measures and could affect land productivity (Abdulai et al., 2008).

The benefits of conservation (extension and ecosystem services) farming to smallholders are the main argument for promoting this farming practice which is increasingly being adopted in a number of sub-Saharan African countries. However it is also important to analyze its potential in overcoming information asymmetry and lack of collateral. Compared to conventional farmers, conservation/ecosystem farmers are able to send an observable signal about their business abilities to lenders, and thus they may enjoy favorable credit contract terms. Observable signals are, but not restricted to, farm business records, involvement in extension services and contract framing. The effect of observable signal, in this case conservation and ecosystem services, on

credit term could bring about a separation equilibrium rather than the current pooling equilibrium were all SMEs are bundled as an entity irrespective of farming attributes.

Do financial institutions interpret ecosystem services as a signal of business acumen? Can participation in extension services (conservation) and ecosystem services actually improve the conditions under which credit is extended to farmers? To the best of our knowledge this is the only study which links extension services (conservation) /ecosystem services to signaling in developing countries. This paper not only sheds light on signaling and sustainability research but also examines ongoing extension services (conservation) /ecosystem services program were limited or no additional infrastructure is necessary in developing countries. This is, existing structures and agricultural systems can be leveraged through this program, which aims to reduce information asymmetry and bring better access to credit to remote regions with limited market access.

To investigate the aforementioned mechanism, the signal game framework of Han et al. (2009) is used as the underlying model to verify if participation in extension services (conservation) and ecosystem services lead to separation equilibrium in credit contracts extended to (conserve) smallholders.

The remainder of the paper is structured as follows: section 2 introduces the theoretical framework of the signaling model and develops the hypotheses. Section 3 elaborates on relevant data used in the paper. Section 4 carries out an econometric regression in order to verify the hypotheses. Section 5 concludes.

## Theoretical discussion

The model described by Han et. al (2009) is based on the premises of sorting by observed risk (SBOR) (applicable in the design of credit contracts) and sorting by private information (SBPI). SBOR implies that financial institutions may require collateral from and/or impose higher Interest rates on observed risky borrowers. SBPI is the signaling of creditworthiness via the collateral put up by borrowers (Han and Zhag, 2012).

In their article, Han et. al (2009) assume that financial institutions know the return on a project but are not familiar with the business ability of borrowers. Therefore, these formal institutions base client segmentation on an observed signal. Examples of observable signals are business records and legal business affiliations, both of which can be obtained by the lender without significant cost. One issue with signaling is character imitation, e.g. borrowers who signal a high degree of creditworthiness but actually are not very creditworthy. We use Han et al.'s (2009) approach and model farmers with and without carbon credits who demand credit for a farming project. This farming project requires an exogenous investment ( $K$ ) which is completely financed by formal institutions. The success of the farming project depends on the farming ability  $\theta$  of the farmer with a probability  $p(\theta)$ . Highly-skilled farmers are denoted by  $\theta_H$  and low-skilled farmers denoted as  $\theta_L$ ,  $\{\theta_H, \theta_L\} \in (0, 1)$ . A farmer repays if the project is successful and defaults if it fails. The probability of project success is equal to farming ability of the farmer  $P = \theta$ . Contract credit is made up of interest rate  $r$  and collateral  $C$  where repayment of credit  $= (1 + r) K$ .

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The Project (farming) return is:

$$return = \begin{cases} (1 + \theta)k \rightarrow \text{with probability } (w.p.) \rightarrow \theta \\ 0 \rightarrow \text{with probability } (w.p.) \rightarrow (1 - \theta) \end{cases}$$

Utility function of the farmer at the end of the period for

- a. successful project ( $U^{S|carbon}$ ) = (Initial wealth + potential cash flow from carbon credit) + project return – credit repayment:

$$U^{S|carbon} = (W + CF_{carbon}) + ((1 + \theta) K) - (1 + r) K = (W + CF_{carbon}) + (\theta - r) K \quad \text{w.p. } \theta \quad (1)$$

$$U^{S|Conventional} = (W + ((1 + \theta) K) - (1 + r) k) = W + (\theta - r) K \quad \text{w.p. } \theta \quad (2)$$

- b. Failed project ( $U^F$ ) → Initial wealth – Collateral pledge (due to default )

$$U^{F|carbon} = (W + CF_{carbon}) - C \quad \text{w.p. } 1 - \theta \quad (3)$$

$$U^{F|Conventional} = W - C \quad \text{w.p. } 1 - \theta \quad (4)$$

Expected project utility (EU):

$$EU^{carbon} = \theta U^{S|carbon} + (1 - \theta) U^{F|carbon} = (W + CF_{carbon}) + \theta^2 K - r\theta K - (1 - \theta)C \quad (5)$$

$$EU^{Conventional} = \theta U^S + (1 - \theta) U^F = W + \theta^2 K - r\theta K - (1 - \theta)C \quad (6)$$

Prior to the signaling process the bank estimates that the distribution of farmers by type is equal, i.e.  $P(\theta_H) = P(\theta_L) = 0.5$ . Moreover, the bank assumes that the probability of receiving a high-quality signal from a highly skilled farmer is equal to that of receiving a low-quality signal from a low-skilled farmer, i.e.,  $\Pr(\bar{s} | \theta_H) = \Pr(\underline{s} | \theta_L)$ . The conditional probabilities of receiving the respective signals from the different types of farmers are:

$$\Pr(\bar{s} | \theta_H) = \Pr(\underline{s} | \theta_L) \frac{0.5\alpha}{0.5\alpha + 0.5(1 - \alpha)} = \alpha \quad (7)$$

$$\Pr(\bar{s} | \theta_L) = \Pr(\underline{s} | \theta_H) = 1 - \alpha \quad (8)$$

The latter conditional probability represents the case of a conventional farmer participating in a conservation program, i.e., the probability of a low-skilled farmer sending a high-quality signal and vice versa. The former conditional probability  $\alpha$  is assumed to be  $\geq 0.5$ . If  $\alpha$  is less than 0.5 then  $\bar{s}$  is not an accurate signal of high-quality. With better information, formal institutions could design contracts for each type of farmer. Thus the bank offers two types of contracts: one for highly-skilled farmers  $\Gamma(r_H, C_H)$  and one for low-skilled farmers  $\Gamma(r_L, C_L)$ . Assuming separate contracts, the expected profits of the bank are, in the case of

a. High quality signaling :

$$E\bar{\pi} = \alpha[\theta_H(1+r_H)K + (1-\theta_H)C_H - K] + (1-\alpha)[\theta_L(1+r_L)K + (1-\theta_L)C_L - K] \quad (9)$$

b. Low quality signaling

$$E\pi = (1-\alpha)[\theta_H(1+r_H)K + (1-\theta_H)C_H - K] + \alpha[\theta_L(1+r_L)K + (1-\theta_L)C_L - K] \quad (10)$$

### Self-selection mechanism

Bank contracts can promote self-selection if two conditions are satisfied: *individual rationality* and *incentive compatibility*. For both lender and farmer, the *individual rationality* condition states that if the expected utility of undertaking the project is larger than the utility of not undertaking, i.e.,  $W$  for the conventional farmer and  $W + CF_{\text{carbon}}$  for the sustainable farmer then the project will be undertaken.

$$\text{Thus : } EU_i^{\text{carbon}}(\Gamma_i) = (W + CF_{\text{carbon}}) + \theta_i^2 K - r_i \theta_i K - (1 - \theta_i)C_i \geq (W + CF_{\text{carbon}}) \quad (11)$$

$$\theta^2 K - r\theta K - (1 - \theta)C \geq 0 \quad (12)$$

For the formal financial institution this condition implies:  $E\bar{\pi} \geq 0$  if signal  $s = \bar{s}$  and  $E\pi \geq 0$  if signal  $s = \underline{s}$

For farmers the *incentive compatibility* ensures that it is optimal to choose contracts meant for them, and not to opt for the other contract, i.e. high quality farmer  $EU_{H\text{Carbon}}(\Gamma_H) > EU_{H\text{carbon}}(\Gamma_L)$  and low quality farmer  $EU_L(\Gamma_L) > EU_L(\Gamma_H)$ .

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### Data and Variables

In April 2013, a survey was carried out in the eastern, central, and rift valley provinces of Kenya where 52 smallholder farmers (0 – 8 hectares) were randomly sampled. A structured questionnaire was developed and pilot-tests conducted before interviews were conducted amongst agricultural SMEs.

Table 1: Descriptive statistics

Variables	N	Mean	Standard Deviation	Min.	Max.
Credit interest rate (%)	52	12.92	5.34	2	20
Maintains business records (yes/no)	52	0.42	0.5	0	1
Cattle (apiece)	52	1.63	1.33	0	7
Farm size (hectares)	52	0.86	1.26	0.1	8
Conventional credit institution	52	0.13	0.34	0	1
Microcredit institution	52	0.62	0.49	0	1
Co-operative bank	52	0.31	0.47	0	1
Income share from cropping	52	57.03	37.08	0	100
Income share from off-farm revenues	52	42.97	37.08	0	100
Income share from non-agriculture	52	43.18	27.21	0	100
Income share from ecosystem payments	52	1.00	2.53	0	13.33

Descriptive statistics presented in Table 1 indicate that the mean interest rate among the 52 borrowers in the sample is 12.92 per cent per annum, with a reported minimum of two and a maximum of 20 per cent.<sup>1</sup> Explanatory variables were collected to capture smallholders' signals in terms of risk of default as well as the credit institution's banking practices.

Approximately 42 per cent of all interviewees confirmed that they maintained written business records, an activity which is central for a bank's signal perception. As for collateral, average farm size totals 0.86 hectares, with a minimum of 0.1 and a maximum of eight hectares.<sup>2</sup> Other tangible assets that may be pledged as collateral by farmers in the absence of real estate are cattle and cars, motorcycles, certain farm implements, home appliances, and cash deposits.

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<sup>1</sup> We excluded those individuals who reported to have been granted credit from other sources, such as family members, friends, or other informal channels. The reason being that we cannot tell whether these individuals are (formal) credit constraint or whether they chose to lend money informally for other, unobservable reasons.

<sup>2</sup> 51 out of 52 interviewees reported to own the land they cultivate. One out of 52 reported to have only leased the land.

Farmers with credit kept on average 1.6 cattle on their farms while off-farm cash-flow was on average 77,500 Kenyan shillings (Ksh) per annum.

The most common credit source for loans is microcredit institutions (62 per cent). Thirty-one per cent of interviewees reported practicing co-operative banking, while only 13 per cent are customers of conventional credit institutions. The contribution of on-farm revenue to total revenue averaged approximately 57 per cent which reaffirms the importance of (traditional) crop production in the income matrix of smallholders. Income shares from off-farm revenues and non-agricultural activities sum up to a total of 43 per cent each. The amount of off-farm revenues in the Kenyan case corresponds with the finding of Jayne et al. (2003) who estimate this value to be 40 per cent. The share of income from ecosystem services as a portion of total income, which should be an incentive for smallholders to engage in ecosystem conservation, is quite small. This may be due to the low price of carbon. On average, this source of income contributes only one per cent of total income, with 18 out of 52 smallholders receiving no ecosystem payments at all. This finding is however in line with that of Tschakert (2004) who found that the percentage for Senegal ranges between 1 and 4.5 per cent. Two interviewees reported revenues from ecosystem conservation in the range of 12 to 14 per cent, indicating that among non-participants of ecosystem conservation practices there is still large room for increases in terms of income, collateral substitute (cash-flow), and positive signaling to financial institutions.

## **Empirical analysis**

In Table 2 the correlation coefficients between relevant variables used in the regression analysis are shown. Given the low correlations between explanatory variables capturing general farm and credit characteristics (see variables no. 2 - 8) it is safe to assume that controlling for these variables simultaneously in a multivariate regression framework does not cause serious biases from multicollinearity. High correlations can be observed between different types of income, as some variables, such as off-farm revenues and non-agricultural revenues (see variables no. 8 - 10), measure similar activities.

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Table 2: Correlation matrix, referring to models presented in Table 3

		1	2	3	4	5	6	7	8	9	10	11
1	Credit interest rate (%)	1										
2	Maintains business records (yes/no)	-0.35	1									
3	Cattle (apiece)	0.16	0.21	1								
4	Farm size (hectares)	-0.11	0.05	0.55	1							
5	Conventional credit institution (yes/no)	0.15	0.23	0.07	-0.08	1						
6	Microcredit institution (yes/no)	-0.03	-0.04	-0.04	0.19	-0.5	1					
7	Co-operative bank (yes/no)	0.06	-0.06	0.15	0.01	-0.14	-0.33	1				
8	Income share from cropping	0.18	-0.02	0.33	0.24	0.22	-0.02	-0.03	1			
9	Income share from off-farm revenues	-0.18	0.02	-0.32	-0.24	-0.22	0.02	0.03	-0.99	1		
10	Income share from non-agriculture	-0.18	0.02	-0.32	-0.24	-0.22	0.02	0.03	-0.99	-1	1	
11	Income share from ecosystem payments	-0.01	0.07	0.25	0.14	0.21	-0.04	-0.16	0.32	-0.32	-0.32	1

In Table 3 the results of a set of OLS regressions are presented. Generally speaking, the low number of observations complicates standard tests on statistical significance. However, the signs and size of coefficients allow an evaluation of the correlates of credit interest paid by Kenyan smallholders. Most importantly, farmers with the ability to maintain business records seem to experience a reduced interest burden compared to their peers who do not keep business

Table 3: Determinants of credit interest rates among Kenyan smallholders

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Maintains business records	-5.00*** (1.273)	-5.00*** (1.273)	-5.00*** (1.273)	-5.00*** (1.273)	-4.89*** (1.290)	-4.89*** (1.290)	-4.88*** (1.290)	-5.03*** (1.262)
Cattle (apiece)	1.62*** (0.439)	1.62*** (0.439)	1.62*** (0.439)	1.62*** (0.439)	1.54*** (0.436)	1.54*** (0.436)	1.54*** (0.436)	1.71*** (0.459)
Farm size (hectares)	-1.21** (0.507)	-1.21** (0.507)	-1.21** (0.507)	-1.21** (0.507)	-1.24** (0.523)	-1.24** (0.523)	-1.24** (0.522)	-1.19** (0.502)
Conventional credit institution	3.30* (1.930)	3.30* (1.930)	3.30* (1.930)	3.30* (1.930)	3.03 (2.030)	3.03 (2.030)	3.02 (2.031)	3.60* (2.008)
Income from cropping (%)					0.01 (0.018)			
Off-farm revenues (%)						-0.01 (0.018)		
Income from non- agriculture (%)							-0.01 (0.018)	
Income from Ecosystem payments (%)								-0.21 (0.232)
Constant	12.98*** (1.201)	12.98*** (1.201)	12.98*** (1.201)	12.98*** (1.201)	12.53*** (1.581)	13.58*** (1.396)	13.59*** (1.399)	13.00*** (1.213)
Observations	52	52	52	52	52	52	52	52
R-squared	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30

Note: Robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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records. The results indicate that banks are willing to provide credit at lower interest rates if the borrower is able to provide transparency about his business situation by providing insights into the farm's financial situation. As for collateral, farm size is negatively correlated with lending rates, indicating that banks prefer real estate over other forms of collateral. The interest rate of credit granted decreases by approximately 1.2 to 1.3 per cent with every additional hectare of farm size. Conversely, the number of cattle owned by the lender is widely accepted as collateral, even though borrowers have to pay a premium for this form of collateralization. The rationale behind the banks' behavior may be explained by the fact that cattle may be sold, stolen or slaughtered even though it has been assigned as collateral.

We also include controls for the type of credit, e.g. microcredit, co-operative or conventional credit institution. The results suggest that loans taken out at conventional credit institutions are substantially more expensive compared to alternative forms of credit. The advantage in terms of interest rate of having access to a microcredit institution or co-operatives amounts to approximately 3 to 3.6 per cent.

In addition, we include variables capturing the effect of income share from traditional farming versus more innovative forms of farming. For example, in model 5 we estimate the effect of the share of income from traditional farming on interest burden. The result indicates that farmers with a large share of income from traditional cropping have to spend more money on interest. The corresponding coefficient indicates that jumping from one extreme (100 per cent of income from traditional agriculture) to the other (zero per cent) results in a reduction of the interest rate in the order of one per cent. Conversely, the share of income stemming from off-farm revenues or non-agricultural activities – two metrics capturing very similar activities – corresponds with lower interest rates of the same magnitude. Interestingly, the share of income from ecosystem payments is correlated with significantly lower interest rates. Jumping from one extreme (0 per cent of income from ecosystem services) to the other (an observed maximum of 13.33 per cent) resulted in a decrease in interest rate in the order of 2.1 per cent. These results suggest that credit institutions reward innovative forms of economic activities, with a reduced interest rate for off-farm revenues and innovative practices of conventional agriculture.

## Conclusion

While the direct impacts of rural SMEs conservation, extension services and ecosystem farming on living standards and ability to cope with climate change in sub-Saharan Africa is well understood, research on the possible secondary benefits to farmers who participate in these activities is slim. Participating farmers may benefit from the ability to signal business success thus creditworthiness to financial institutions in order to obtain access to credit and better credit terms. These farmers also gain valuable collateral that can be put up to better their chances of obtaining loans. In our theoretical model we have shown that PES from extension services (conservation) can serve as a signal to financial institutions about a farmer's business and creditworthiness. We have also shown that credit contract separation improves the loan terms for farmers.

Moreover, empirical evidence for the existence of the signaling game is provided. In order to connect this hypothesis to a real-world scenario, unique data was collected from sustainable farmers. Financial institutions are willing provide credit at lower interest rates if smallholders are able to maintain business records, which allow financial institutions to gain insight into the farm's financial situation. Banks adjust the credit conditions according to the quality of the

borrower's collateral; a low risk for default is signaled if farm land can be offered as collateral, other forms of collateral result in higher interest rates. Most importantly for this study, the empirical evidence suggests that smallholders pay a premium for traditional farming, with no income from sectors other than agriculture. Conversely, farming that includes ecosystem conservation activities seems to offer advantages in terms of less interest paid, as this type of income can increase farmers' incomes and reduce the risk of credit default.

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## **DE-RISKING VC INVESTING FOR OUTSTANDING ROI: AN INTERDISCIPLINARY APPROACH TOWARD THE INTEGRATION OF PEOPLE, PLANET AND PROFIT**

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***Abstract:** This paper makes the case for Integral Investing as a sustainable model for early stage investing. It argues that more sustainable de-risking tools could shift mainstream VC investing toward delivering higher financial returns and integral sustainability. It introduces the Theta Model as a de-risking process that integrates financial criteria with Environmental, Social, and Governance criteria, but also with behavioral, cultural, and individual assessment metrics. First, traditional Venture Capital practice and performance are compared with current developments toward more sustainable investing practices including impact investing. Then, the Theta Model is introduced as an evolutionary-based investment model rooted in Wilber's Integral Theory. The paper shows how the model has been successfully applied in integral due diligence and what were the causes for its outstanding ROI. The paper closes by sharing the lessons learned from positive and negative investment examples and by offering a discussion on how all stakeholders from entrepreneurs to investors could benefit from such integral sustainability metrics in the future.*

***KEY WORDS:** Integral Investing, Impact Investing, Integral Sustainability, Theta Model, AQAL, Integra Theory, Ken Wilber.*

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## Introduction

In the 27<sup>th</sup> issue of the *Economic Bulletin* (Fichtner, & Fratzscher, & Gorning, 2014) of the German Institute for Economic Research (DIW), the authors argued that without major investments Europe is in real danger of falling into an economic stagnation similar to that of Japan in the 1990s. Such stagnation would be marked by greater “*unemployment, declining incomes, decelerating potential growth, and deflation*” (p. 635). The current unemployment rates in Greece with 27.2 percent, Spain with 24.5 percent, Italy with 12.3 percent, and even France with 10.2 percent attest to the already occurring stagnation (Eurostat Unemployment Rate, 2014, July 31). Fichtner et al. (2014) maintained furthermore that most reforms implemented thus far at national and European level have failed to impact economic development in a positive manner and four major crises are exacerbating each other. These are (1) An excessive national, corporate, and private *debt crisis*; (2) A *banking crisis* with an ongoing flawed banking system that prevents businesses and governments from getting access to affordable capital; (3) An *economic crisis* with a lack of structural reforms and an insufficient institutional framework at both national and European level; and (4) A *trust crisis* with a “*persisting climate of distrust in the stability of economic development*” (p. 635). The authors consider current reform efforts not sufficient to address these crises because in their view “*Europe’s biggest economic weaknesses is a lack of private investment and that a European investment agenda is vital in order to generate the impetus required to push the European economy towards a sustainable recovery*” (p. 636). In the light of the sinking investment gap since 1999 (

Table 1), the Baldi, G., & Fichtner, F., & Michelsen, C., & Rieth, M., (2014, July 2) argue furthermore, “*European economic policy should focus not on higher public spending, but on increasing private investment as well as creating markets that function properly*” (p. 636). According to their research, “*current investment in the Eurozone remains markedly below the level corresponding to macroeconomic conditions. When measured against this baseline, there was an underinvestment of around two percent on average in relation to gross domestic product between 2010 and 2012*” (p. 651).

Table 1: Average Investment Gaps between 1999 and 2012 as a Percentage of Individual country's GDP (Baldi et al., 2014, July 2).

**Durchschnittliche Investitionslücken**

In Prozent des Bruttoinlandsprodukts

	1999 bis 2012	1999 bis 2007	2010 bis 2012
Euroraum-18	0,5	-0,1	2,0
Deutschland	2,9	2,5	3,7
Niederlande	2,6	1,9	4,8
Finnland	1,5	1,5	2,0
Belgien <sup>1</sup>	-0,8	-0,5	-0,7
Frankreich	0,0	0,3	-0,3
Österreich	-0,5	-1,0	0,6
Italien	-0,9	-1,4	0,5
Griechenland <sup>2</sup>	-1,5	-5,0	3,0
Portugal	-0,8	-2,7	4,1
Spanien <sup>3</sup>	-4,3	-6,2	1,1
Irland	-0,1	-3,6	9,4
USA <sup>4</sup>	-1,2	-2,3	1,9
Japan	0,1	-0,6	2,4

<sup>1</sup> Berechnungen auf der Datengrundlage 2002 bis 2012.

<sup>2</sup> Berechnungen auf der Datengrundlage 2005 bis 2012.

<sup>3</sup> Berechnungen auf der Datengrundlage 2000 bis 2012.

<sup>4</sup> Berechnungen auf der Datengrundlage 1999 bis 2011.

Quelle: Berechnungen des DIW Berlin.

To address the investment gap, Fichtner et al. (2014) recommend (1) an efficient competitive landscape that becomes attractive for private investment capital; (2) an investment friendly tax policy; and (3) a three digits Billion Euros EU-Investment Fund that would complement the current European Investment Fund (EIF), which is dedicated to Venture Capital and is rather moderate (p. 633-634). While the authors refer to the overall decreasing investment landscape including infrastructure, the same is true for seed and early stage investing. In the United States, *“the activity level of the US venture capital industry [in 2013] is roughly half of what it was at the 2000-era peak. For example, in 2000, 1050 firms each invested \$5 million or more during*

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the year. In 2013, the count was roughly half that at 548.” (Thomson Reuters, 2014, p. 9) Within the European Union, we can witness a similar downward trend (Figure 1).

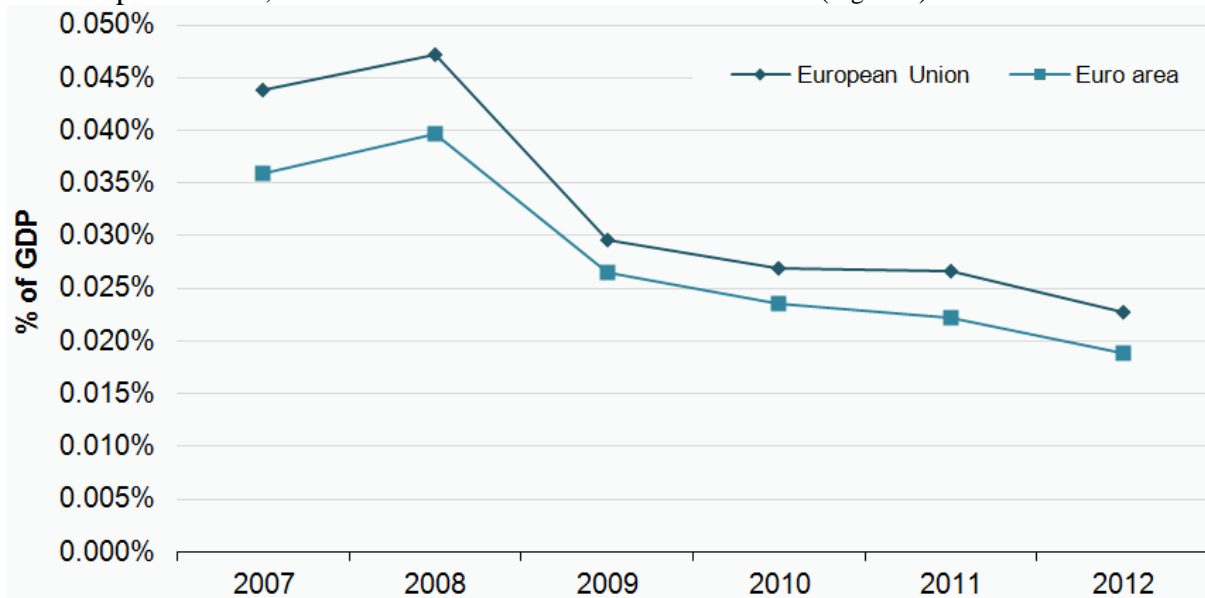


Figure 1: Total Venture Capital Investment in Percentage of GDP within the European Union and the EURO Area (European Commission, n. d.)

The aggregate data representing individual country performance along with “relative weakening of the UK at 0.013% of GDP (down from 0.028% in 2011), Denmark (0.01% against 0.029% in 2011) and Sweden (0.029%, down from 0.031% in 2011)” is shown in Figure 2. This trend can be seen also in more stable economies like Germany, which shows similar declines from 0.01% to 0.007%, but also in France that declined from 0.019% to 0.014%, Italy that decreased from 0.002% to 0.001%, as well as Spain with a weakening from 0.007% to 0.004%” (European Commission, n. d.).



Figure 2: Venture Capital Investments in Seed and Start-up companies as a Percentage of GDP in 2012 (European Commission, n. d.)

The smaller investment market, namely that of business angels, also represents a cause of concern for policymakers, which address it through government-backed venture schemes and tax breaks for angel investors in various countries. Moreover, the 2012 European Private Equity and Venture Capital Association (EVCA) data (European Commission, n. d) suggest that the later stage Venture Capital market also suffered from the systemic weaknesses and the 2013 EVCA report (2014) shows only modest increases in most areas compared with 2012 (Figure 3).

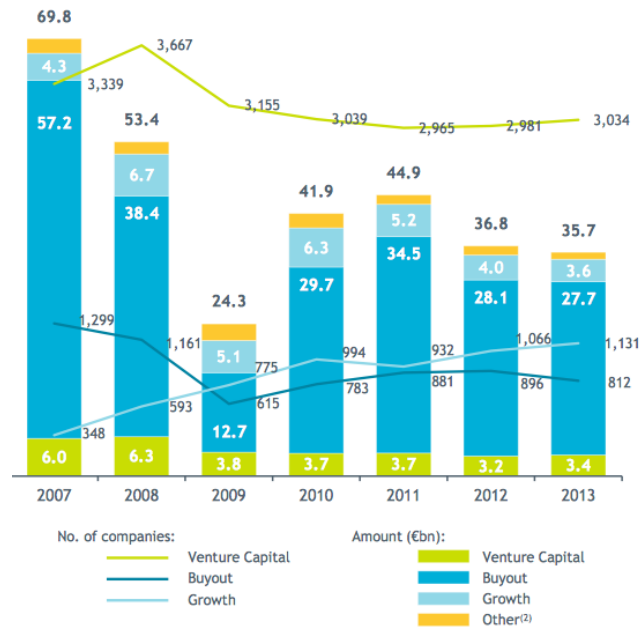


Figure 3: European Investments—Market Statistics—Amount & Number of Companies (EVCA, 2014, p. 29).

Despite the economic downturn of the past decade, European Small and Medium Enterprises (SMEs) “have retained their position as the backbone of the European economy, with some 20.7 million firms accounting for more than 98 per cent of all enterprises, of which the lion’s share (92.2 percent) are firms with fewer than ten employees.” (Wymenga, & Spanikova, & Barker, & Konings, & Canton, 2012, p. 9). Yet, although our future depends upon it, the funding that could secure sustained innovation and creativity is either diminishing or growing too slowly to have a significant impact. In the light of the financial, economic, environmental, geo-political radicalization, inequality, and other crises of our time this investor behavior is understandable, yet the obvious question remains: How can the gap between the demand side and the availability of capital be closed? The answer is multifaceted and just as complex as the problem. However, trust is an important key to closing this gap. This paper shows how our own family office closed this gap in early stage investing, as an asset class, since 1995.

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### How We Handled the Trust Issue: Confessions of an Investor

We are part of the post-post-modern generation, that seeks to integrate financial sustainability with the ideals of the so called “cultural creatives,” which in the year 2000 represented between 25 and 30 percent of the Western population (Ray & Anderson, 2000). That means the integration of sound financial, economic, environmental, governance criteria with geo-political sustainability for the benefit of all. We perform this integration through our business and investment activities as well as through our philanthropic and venture philanthropic activities. Unfortunately, neither the traditional philanthropic, economics, finance, investing models in general nor the Venture Capital models in particular gave us the necessary framework to invest with both our values as well as with our money. As discussed in earlier papers (Bozesan, 2013a, 2013b), we felt that traditional investment systems were outdated and missing important aspects of life just as much as existing philanthropic models did. Having been part of the human potential movement for decades, we knew that trust toward others begins by trusting oneself. We also knew, that more trust or a feeling of security couldn’t come from higher profits at the expense of people or the planet. We knew that they could only come from our heart and soul, and from what we were willing to give to the world rather than want to receive from it. Hence, we looked for an integration vehicle for all our value systems, which Plato (1961/1938) called the *True*, the *Good*, and the *Beautiful*—or Science, Morals, and Arts. We felt the need to *self-actualize* (Maslow, 1999) through an integration of all our activities, not just the financial, the business ones, or the philanthropic ones. We did not want to make money at the expense of other people or the environment. We did not want to make money during the day within a for-profit-only-oriented context and spend the evenings or the weekends at fundraising events donating to various causes to fix social injustice and/or environmental degradation. We wanted to prevent all of that from happening and saw business as a unique vehicle to pursue that goal. We began investing in and building businesses that were sustainable in all areas financially, socially, ethically, and environmentally. Our investment motto became the six Ps: the *Parity of People*, *Planet*, *Profit*, all of which we wanted to integrate with our own *Passion* for life and in line with our ultimate life’s *Purpose*. In the late 1990s, we discovered the ideal framework for our six Ps, namely, Ken Wilber’s (2000) integral theory that is based on Plato’s (1961/1938) work (Figure 4).

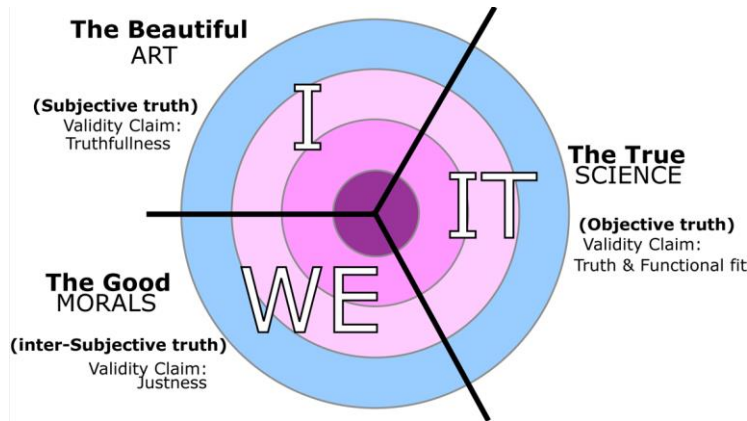


Figure 4: The Value Spheres of Humanity, the Big Three. Derived from Wilber's (2000a, p.64) Integral Theory.

Soon, we found out that the Integral Model (Wilber, 2000a) is based not only on Plato's (1961/1938) irreducible value spheres, it also includes Kant's (1949/1993) *Big Three* critiques; the *Critique of Pure Reason* (the True, "IT" or objective rationality), *Critique of Practical Reason* (the Good, "WE," or morals), and *Critique of Judgment* (Beauty, "I," or subjective reality). And, it also rooted in Habermas' (1992) indivisible three Worlds, the objective, the subjective, and the cultural. We were thrilled about the simplicity, comprehensiveness, and elegance of the Integral Framework and developed our own investing model based on it. We call it the Theta Model and have successfully applied it in all our investments since the turn of this century. In this paper, we will briefly introduce it and show how we apply it in early stage investing to de-risk our investments and to create successful businesses. The Theta Model has (1) contributed to significantly reduce the risk of our early stage investments over the past 20 years; (2) supported our single family office in achieving a constant *multiple* of 6.8 on average over the past twenty years; and (3) helped us on our self-actualizing journey by providing an integration vehicle between our investment activities and our philanthropic endeavor.

## There is Reason for Hope: Trends in Investing, Banking, and Finance

Despite many irritating developments, some of which we outlined in the introduction of this paper, we are not alone with our approach and there is much reason for hope. Before presenting the Theta Model, we would like to set the context in which current transformative developments in the industry are taking place through fellow investors, all of which give reason for hope. The hope comes from a promising and ever growing number of investors who are currently changing the investment paradigm through various initiatives and activities that try to bring back trust in our economy, financial systems, the environment, and geo-political systems by showing various paths toward "integral sustainability" (Brown, 2007, p. 1; Esbjörn-Hargens & Zimmermann, 2009, p. 245). One such initiative is the Natural Capital Declaration (The Natural Capital Declaration, n. d.) emitted by 37 banks, investment funds, and insurance companies, which aimed at integrating natural capital criteria (soil, air, water, flora, and fauna) in their products and services. Another is the Sustainable Stock Exchanges Initiative (Panwar & Blinch, 2012), a

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commitment made during the past Earth Summit in Rio de Janeiro in 2012 (Rio+20, n.d.) by five major stock exchanges that collectively list more than 4,600 companies, with the intention to promote sustainable investments through a global call for sustainability disclosure and performance by the companies listed on their trade floors. The *Giving Pledge*, launched on August 4th, 2010, is another initiative through which some “*of the wealthiest families and individuals in the United States [and the rest of the world] have committed to returning the majority of their wealth to charitable causes*” (Giving Pledge, 2010). The AVIVA (2011) coalition, an alliance of more than 40 like-minded private and institutional investors managing collectively approximately US \$2 trillion, is yet another alliance of investors who have agreed to promote the long-term sustainability of their investees through more reliable information and more robust measurement criteria that could drive more sustainable performance and demonstrate reliably the value of non-financial information including Social, Environmental, Governance criteria (Tomorrow’s Capital Markets, 2012). Moreover, the Global Alliance for Banking on Values provides hope through an independent network of more than 24 of the world’s leading sustainable banks. They published a report (GABV, 2012), which assessed the performance of banks over ten years from 2002 to 2011 and demonstrated how they are (a) eliminating the myth about lower returns through sustainability, (b) showing that sustainable banks have higher returns on assets than regular banks, (c) indicating significantly higher levels of growth in loans and deposits than traditional banks, (d) exhibiting higher and better quality capital inflows; and (e) revealing that sustainable banks are both investing more successfully in a greener and fairer society while having more robust and resilient business models than traditional banks. Furthermore, the International Integrated Reporting Council (IIRC) is a “*global coalition of regulators, investors, companies, standard setters, the accounting profession and NGOs . . . that share the view that communication about businesses’ value creation should be the next step in the evolution of corporate reporting*” (The IIRC, 2013). And last but not least, the Global Sustainable Investments study (GSIA, 2012) showed that investments using some kind of Environmental, Social, and Governance (ESG) criteria reached an invested amount of US\$ 13.6 trillion equivalent to 21.8 % of total AuM worldwide in 2012 with (a) Negative/exclusionary screening representing US\$ 8.3 trillion AuM; (b) Norm-based screening at US\$ 3.0 trillion AuM mostly Europe (65% of known SRI AuM); (c) Positive/best-in-class screening at 1.0 trillion AuM, mostly US; (d) Assets utilizing ESG integration were at US\$ 6.2 trillion; and (e) Impact Investing being still fragmented and comparatively small at US \$89.0 billion.

### *A Word on Impact Investing*

On one hand, there is traditional investing that is profit oriented and that challenges investors to earn superior financial returns consistently. On the other hand, we can see that over the past decades an increasing number of investors began integrating their values by looking for more responsible investment opportunities that make a profit in addition to having a social and/or an environmental impact. The mindset transformation of the participating agents paved the way toward the development of Impact Investing in 1985 that is considered to be its birth year according to Robeco & Booz & Co. (2009). This trend grew slowly but surely so that Impact Investing appears to have become a separate asset class according to the same source. Similar forms of investing with comparable criteria are also known as Social Responsible Investing (SRI), Program Related Investing (PRI), Mission Related (MRI), or Triple Bottom Line

Investing (TBLI). Impact Investing appears to be rather promising because it is driven by the investors' *intention* to make a difference (Bugg-Levine, & Emerson, 2011) and is measured through financial criteria alongside Environmental, Social, and Governance (ESG) criteria (Freireich & Fulton, 2009; Robeco & Booz & Co., 2009). Unfortunately, according to Randall Kempner, Executive Director, of Aspen Network of Development Entrepreneurs, Aspen Institute *“Impact Investing is currently growing linearly. In order for it to grow exponentially, we need to find a way to incorporate mainstream investors into the mix”* (Bryce, Drexler, & Noble, 2013). In earlier publications (Bozesan, 2010, 2013a, 2013b) we have shared our own research that demystifies some of the drivers behind this development, the most important of which is consciousness evolution. Figure 5 supports our findings and shows who are the main players in this industry whereby family offices and high net-worth individuals are paving the way.

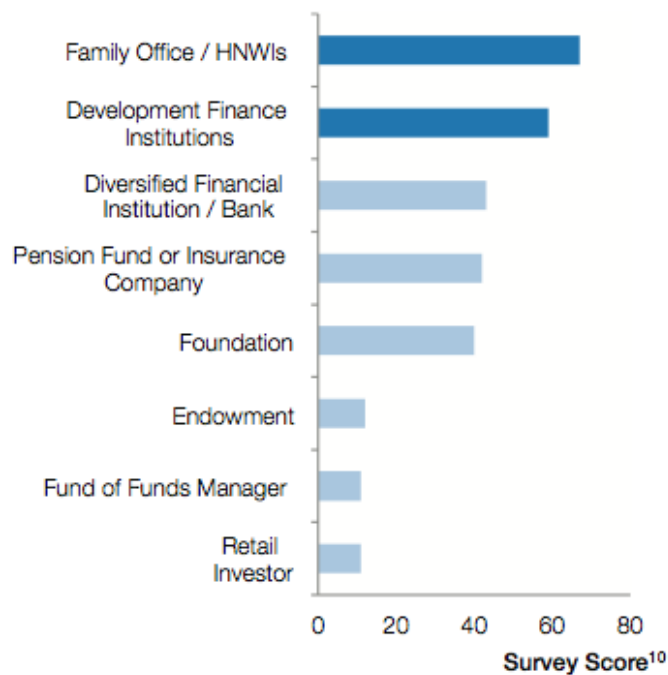


Figure 5: Source of Funds for Impact Investment Fund Managers in 2012 (Bryce, Drexler, & Noble, 2013).

In this paper, we focus on how we are integrating these criteria in our own investing activities. However, in order for the industry to grow exponentially, we believe that Impact Investing must consolidate and become mainstream. It must become more aligned and develop better-integrated and more easily measurable criteria for mainstream investing for both in the West as well as in developing countries (Bryce, Drexler, & Noble, 2013). In our view, what impedes Impact Investing from becoming mainstream are current incentive structures. These are predominantly influenced by short-term financial performance, market indices, benchmarks, market share, personal security, success, and reputation, as well as regulatory compliance, few of which contain long-term sustainability aspects that are currently tagged as externalities (Tomorrow's Capital Markets, 2012). New compensation structures should aim at discouraging unsustainable behaviors in the participating agents that in the past lead to goal misalignment, cultures of fear,

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growing self-interest, communication gaps, and high-levels of remuneration that were linked to short-term profits.

### What Could Build More Trust and De-risk Investments

In this chapter, we will focus on what helped us build more trust in our decisions and supported us in integrating our values with our investment activities. We will begin by highlighting a few significant de-risking aspects that we gained from applying Wilber's Integral Model (2000), which will be explained in more detail later in the text.

The first factor is the *theory of evolution*. To get a better understanding of the role of evolution in investing, let us take a closer look at a well-known model with which many business people have become familiar, namely Maslow's (Maslow & Stephens & Heil, 1998) pyramid of needs. According to Maslow (1998), humans apparently evolve during their lifetime along his pyramid, whether or not they are able to fulfill their needs. The model contains consecutive stages of development starting with (a) survival/physiological needs for air food water, sex, sleep; to (b) safety/security needs for health and property needs; to (c) social needs for love to (d) ego/self-esteem needs for confidence and achievement; (e) to self-actualization needs for high morals and creativity with lack of prejudice and acceptance of facts; to (f) self-transcendence needs (Maslow et al., 1998, Maslow, 1999). As individuals grow along these stages of development from *selfish/preconventional* stages, via *care/conventional* stages, to *universal care/postconventional* stages of moral development (Gilligan, 1993), we apparently begin to take a more global view on life and adapt higher moral standards (Commons & Armon & Richards (Eds.), 1984; Commons & Armon & Kohlberg & Richards & Grotzer (Eds.), 1990; Gardner, 1993, 2004; Gebser, 1984; Gilligan, 1993; Cook-Greuter, 2004, 2005, 2008; Kohlberg & Ryncarz, 1990; Wilber, 2000a, 2000b). Therefore, at later stages of development, individuals appear to be in a much better position to apply Kant's categorical imperative (Kant 1949/1993) and to make more compassionate decisions that come from a higher ethical standard, so badly needed in the current crises (Baier, 1994/1996; Blackburn, 2001; Dalai Lama, 1999). Furthermore, from a collective perspective, the evolution of social systems and/or cultural structures can be categorized either (a) according to the infrastructural and techno-economic base of the society, which includes evolutionary periods such as the foraging, horticultural, agrarian, industrial, informational stages of development (Beck & Cowan, 1996); or (b) according to the predominant worldview of the culture such as archaic, magic, mythic, scientific-rational, pluralistic, integral (Gebser, 1949/1984) or simply pre-modern, modern and postmodern. The cultural worldviews are intimately correlated with the social techno-economic structures because they occurred together and are influencing each other. They are different facets of the same coin. Therefore, understanding and acknowledging the fact that the multitude of societies and cultures on earth are at different levels of evolution and apparently at different levels of consciousness, is key within the context of this paper. This understanding, has helped our family office invest much more sustainably and compassionately by meeting people at their own levels of consciousness and not our own. It helped us acknowledge, honor, and celebrate the fact that humanity, as a whole is completely heterogeneous.

The same effect had the *inclusion of emotional intelligence* (Goleman, 1995) and *other human intelligences* (Gardner, 1993) in our due diligence processes. The scientific community,

from economics, finance, behavioral finance, to neuroscience and psychology (Camerer & Loewenstein, 2004; Yazdipour, 2011) appears to be united in the fact that behavior is influenced by our psyche “in-here” rather than “out there.” These various dimensions of consciousness are permanently co-arising and are deeply influencing our decisions whether we consider them or not (Beauregard & O’Leary, 2007; Kahneman & Tversky, 1982; Newberg & Lee, 2005; McCraty, 2001, Wilber, 2000b).

The desired transformations toward “*integral sustainability*” (Brown, 2007) occurs within a very complex context, which includes what is obvious to the eye from the outside, namely the environmental, financial, economic, and social structures, as well as the collective and individual behavior. But it also includes what cannot be seen from the outside, namely the *individual interiors*—emotions, psychology, and cognition—of participating agents, both individual as well as collective levels. What Krugman (2012) called “obsolete doctrines that clutter the minds of men” (p. 191) are actually socio-political and inter-objective contexts, rules, systems, and regulations. They contain also cultural inter-subjective and deeply ingrained norms, such as ethics and morals that influence our individual and collective behaviors (Baier 1994/1996; Gilligan, 1993; Kohlberg & Ryncarz, 1990). Adding all these additional lenses to the due diligence process in investing can be cumbersome, intensive, and expensive. However, they also add a higher level of granularity to the process and can help build more trust both in oneself but also in the investees and in the relationship between the two.

## A Model for Integration

As investors, we consider ourselves to be the custodians of financial capital, natural capital, but also human capital—including interior values such as joy and happiness. Figure 6 depicts how we see the integration occur using Wilber’s (2000) integral theory.

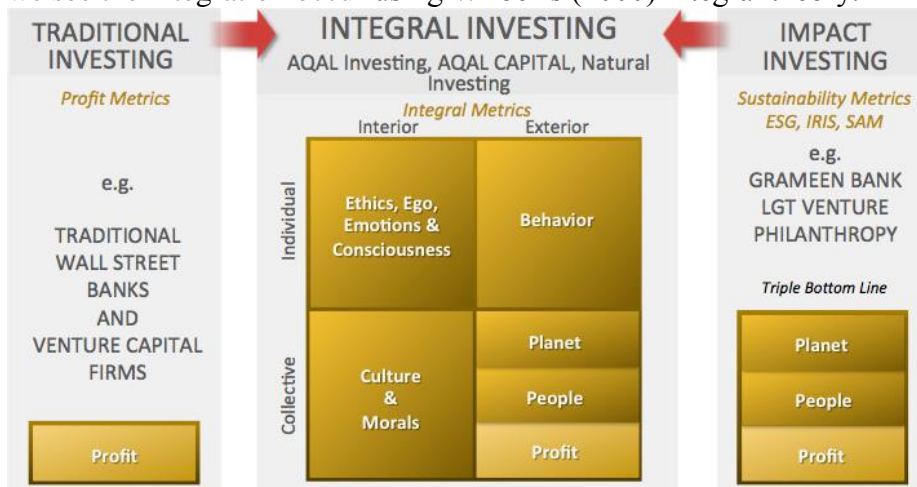


Figure 6: Integral Investing as the Integration between Traditional Investing and Impact Investing (Bozesan, 2011a, 2011b, 2012, 2013a, 2013b).

We are deploying capital for sustainable and optimal risk-adjusted financial return, coupled with long-term, premium-impact return, and take this responsibility toward future generations very seriously. To fulfill this responsibility, we combine investment criteria common in traditional

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investing with criteria that include Environmental, Social, Governance aspects, but also happiness and making-a-difference-in-the-world factors. We call this *Integral Investing* and the actors performing it *Integral Investors*. We define *Integral Investing* as the application of Wilber's Integral Framework in investing across all asset classes (Figure 7).



Figure 7: Positioning of Integral Investors (Bozesan, 2013a, 2013b).

The detailed discourse behind this integration can be found in previous publications (Bozesan, 2011a, 2011b, 2012, 2013a, 2013b) and will not be repeated here. What we will discuss next is how we perform the due diligence process within the Theta Model.

### The Theta Model: Theoretical Foundations

Wilber's (2000) Integral Model provided us with a post-post-modern framework that gave us hope because it enabled us to implement the desired integration of our six Ps: *People Planet, Profit, with Passion and Purpose*. It is based on the *theory of evolution* (Figure 8) and it integrates humanity's indivisible value spheres described by Plato (1961/1938) as the True/Science, the Good/Moral, and the Beautiful/Art (Figure 4). It taught us to honor the truth in all there is, appreciate diversity in culture, and see reality as a whole, in which every exterior has an interior that influences it. In practical terms, we could see why an average investor who lives in a post-modern society such as Western Europe will, most likely, have a different view of the world and therefore another investing behavior and portfolio than an investor from an emerging economy such as the BRIC states (Brazil, Russia, India, China). Therefore, the application of Wilber's integral model provided us with a very powerful de-risking tool. It gave us a differentiated view of our investees depending upon the vertical altitude in each quadrant (Figure 8) but also on how well the horizontal integration across the quadrants has occurred. It opened our eyes to a reality that is made of a complex web of interrelated and intra-connected *ecological* structures, *social* systems, and *cultural* determinants, all of which are subject to *evolution* from simple structures to more complex ones (Gebser, 1984; Wilber, 2000, 2000a, 2000b, 2006).



Figure 8: Wilber's Integral Model and Evolution (Wilber, 2000a).

The upper-left quadrant in Wilber's (2000a) model refers to the *interior individual* domain, the *terrain of experience*. It is the personal subjective area and the inner life of an individual. It "includes the entire spectrum of consciousness as it appears in any individual, from bodily sensations to mental ideal to soul and spirit" (Wilber, 2000a, pp. 62-63). Here is the home of our individual interiority and contains several lines of interior development including cognition, aesthetic, morals, emotions, self, and ego development. According to leading developmental psychologists such as Graves (Beck & Cowan, 1998), Gilligan (1982/1993), Cook-Greuter (2005), Kegan (1982), Kohlberg & Ryncarz (1990), Loevinger (1977), Maslow (1999), and Wilber (2000a), we are subject to an evolutionary process along various lines of development (morals, values, needs, cognition, self-identity, etc.) represented in Figure 9 (Wilber, 2006).

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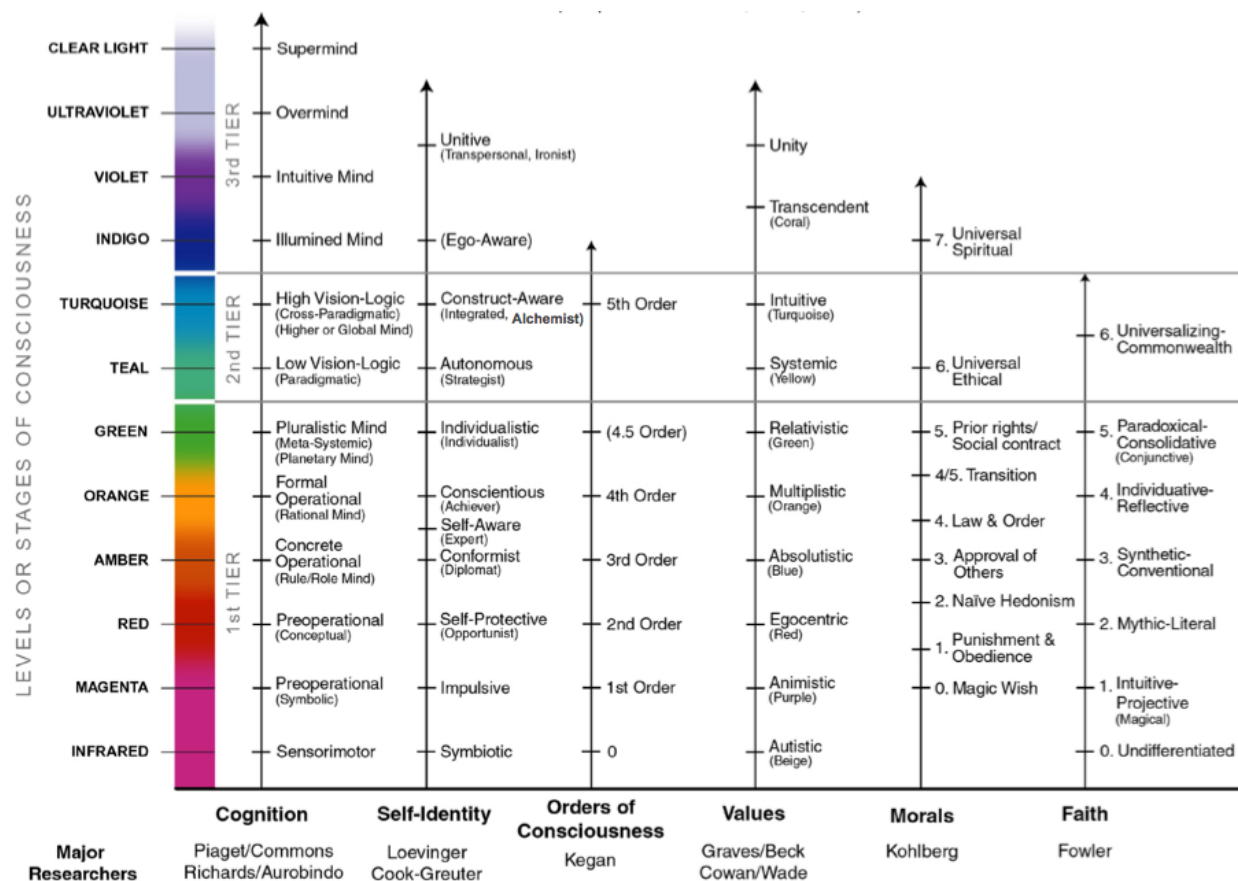


Figure 9: The Spectrum of Consciousness with Six Major Developmental Lines adapted from Wilber (2006).

Especially after the 2008 financial disaster, the call for higher ethics increased significantly. Yet, humans do not grow at will and not over night. Those of us who have ever tried to lose weight, stop smoking, or change any unwanted behavior know how difficult such a process can be. Whether we acknowledge it or not, we appear to be driven by our interior dimensions (Commons & Armon & Richards (Eds.), 1984; Commons & Armon & Kohlberg & Richards & Grotzer (Eds.), 1990; Gardner, 1993, 2004; Gebser, 1984; Gilligan, 1993; Cook-Greuter, 2004, 2005, 2008; Kohlberg & Ryncarz, 1990; Wilber, 2000a, 2000b). The lower-left quadrant (Figure 8), the *terrain of culture*, enlarges the perspective of reality through the interpersonal subjective areas of our culture, such as beliefs, norms, justness, and goodness. Wilber (2000b) defined this quadrant as “the values, meanings, worldviews, and ethics that are shared by any group of individuals” (p. 63). The cultural context in which for instance investing, businesses, politics, science, and education occur, are at the heart of our inter-subjective, collective humanity. It gives our existence meaning, we become almost inseparable from it, because it becomes what we perceive to be our absolute reality. The reason why, within the parameters of neo-classical economics, the two *territories of felt experience* and *culture*—individual and collective interior—have apparently been excluded, is because it erroneously seemed difficult to prove in a scientific manner (Camerer & Loewenstein, 2004). This separation occurred because neither behavioral economics (Kahneman & Tversky, 1982) nor scientific psychology existed as academic

disciplines at that time. As a result, the interior dimensions were dropped all together and neo-classical economics was reduced to profit and utility maximization. Based on the prevalent collective center of gravity at that time, the notion of the *self-interested homo economicus* (Aspromourgos, 1986) was born. The financial crisis of 2008 was the culmination thereof and this paper is attempting to demonstrate how this is currently changing within the field of investing.

Wilber's (2000a) upper-right quadrant (Figure 8) refers to the exterior or the more objective states of being, the *terrain of behavior* also called the individual exterior/objective domain. This terrain is more easily measurable with the scientific methods available today and includes "the brain mechanisms, neurotransmitters, and organic computations that support consciousness" (Wilber, 2000b, p. 63). The objective perspective at this level permits the examination of exterior behavior and the structure of each individual phenomenon from humans to animals to insects. This is traditionally the home of natural sciences including cognitive science, mathematics, financial theory, chemistry, physics, biology, biochemistry, neurophysiology, and empiricism.

The lower-right quadrant (Figure 8) is the *territory of systems theory and analysis*. This quadrant is the area in which institutions, businesses, and geopolitical organizations are traditionally inter-operating in an objectively measurable and systemic way. Similar to the upper right quadrant, this is also the domain in which science has conventionally been active but from the perspective of social sciences and systemic natural sciences. This is the home of economics, business, civil and environmental engineering, ecology, astronomy, astrophysics, sociology, and other systemic and infrastructural contexts. The inter-objective perspective that can be taken at this level permits the configuration and exterior behavior analysis of collective phenomena. These include economic and financial systems, ecological and social systems, as well as legal and political systems.

From the vantage point of investing, this quadrant is the home of traditional financial and legal due diligence, as well as the Environmental, Social, and Governance Key Performance Indicators (KPIs). Yet, requesting the fulfillment of these requirements alone - such as the UN Principle for Responsible Investing (UN PRI, 2013), the Global Impact Investing Network (GIIN, 2013) Impact Reporting and Investment Standards (IRIS,) or the Global Impact Investing Rating System (GIIRS, n.d.) by B Lab, are not sufficient to ensure their application. Therefore, we will introduce below a few developmental measurement tools that have been shown to successfully (Pfaffenberger, 2006) de-risk investments and which we apply within our Theta Model and De-risking Process. Next, we will elucidate this model in more detail.

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## The Theta Model: Tools, Processes, and Measurements

### *A Mandate for Integral Sustainability*

The investment philosophy of our family office mandates that rigorous financial measurement criteria be intimately correlated with environmental, social cultural, (ESG) criteria, as well as behavioral, ethics, morals, and higher human values. We call our investment mandate Integral Investing (Figure 6) and summarize our requirements as the six Ps, the Parity of People Planet, Profit, with Passion and Purpose, discussed earlier. Integral Investment informs us about additional aspects of reality—including interior, evolutionary, behavioral, inter-objective, and inter-subjective—that are constantly co-arising and affect us whether we are aware of them or not. It encourages us to take a broader view of reality in all our investment activities and helps us fulfill Brundtland’s (World Commission on Environment and Development, 1987/2009) request for integral sustainability, which “meets the need of the present without compromising the ability of future generations to meet their own needs” (p. 43).

### *The Theta Model Defined*

We developed the Theta Model with the intention to fulfill our mandate in a very concrete manner. The Theta Model is an integration and de-risking framework that contains tools and processes that help us bridge traditional due diligence with integral impact investment performance (Figure 6). Figure 10 shows how we extend traditional financial and legal due diligence to include Environmental, Social, and Governance criteria, but also evolutionary metrics that help us assess the team culture as well as individual team members in our screening procedure with a high degree of sophistication and accuracy.



Figure 10: The Theta Model and Process (Bozesan, 2013a, 2013b).

### *The Theta Toolbox and its Metrics*

The Theta Model (Figure 10) helped us refine our de-risking tools and significantly enhance our investment measurements. Through the usage of this integral investment lens we identified a whole host of tools with which we developed a comprehensive de-risking toolbox (Figure 11).



Figure 11: The Theta Toolbox (Bozesan, 2013a, 2014b).

As measurement criteria we use (a) the sustainable integration between traditional, profit-oriented, investing criteria (financial and legal due diligence tools); (b) impact investing measurements with their Social, Environmental, and Governance (ESG (UN PRI, 2013) metrics; and (c) behavioral, cultural, and consciousness criteria as defined in Wilber's (2000) integral framework. The Theta Toolbox includes the four Wilberian (2000) quadrants, ESG metrics, instruments for assessing the vertical altitude (Figure 8) in each quadrant, as well as even more important proficiencies for the horizontal integration of all quadrants. By adding multiple worldviews and perspectives we significantly reduced our investment risk also within the context of our philanthropic or venture philanthropic endeavors. Its application helped us achieve remarkable financial returns alongside sustainable integral impacts since the turn of the century.

### *Value Chain Creation in Early Stage Investing: Creating Integrally Sustainable and Responsible Companies from the Very Beginning*

The Theta Model is an accelerator for screening and decision-making but also a vehicle for the speedy creation of successful and sustainable companies from the very beginning. Figure 12 shows the process through which we apply the model along the value chain in early stage investing from deal sourcing, over screening and due diligence, investment execution, company monitoring, and finally exit.

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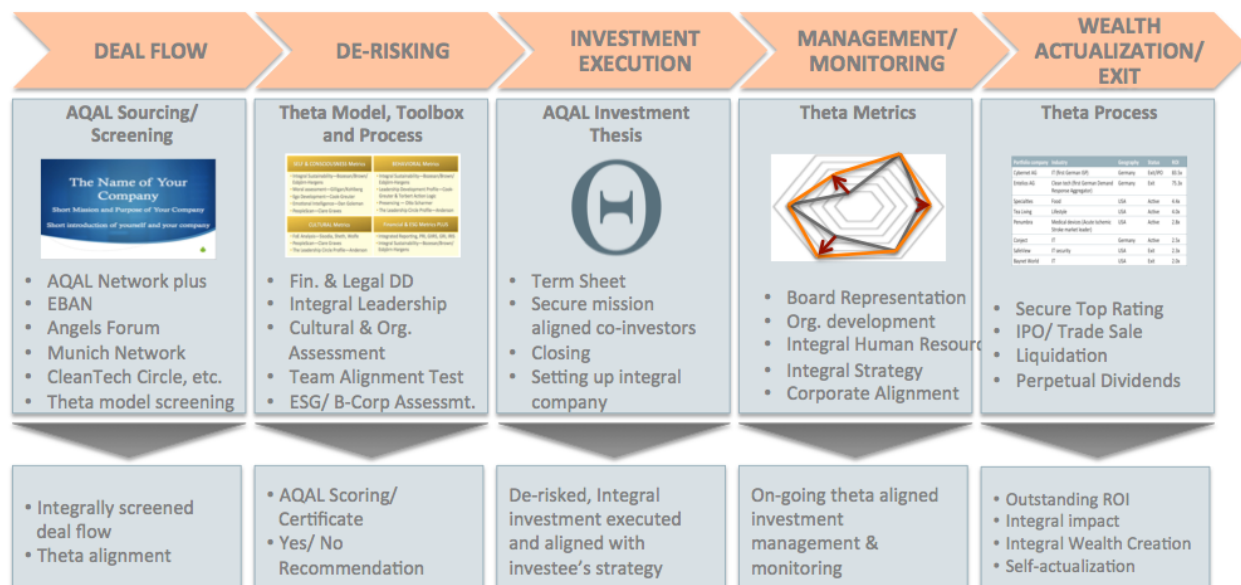


Figure 12: Value Chain Creation: The Application of the Theta Model in Early Stage Investing.

Our financial and legal due diligence is identical with traditional methods undertaken in traditional venture capital firms. Therefore, we will spend some time elaborating next on the application of the Environmental, Social, and Governance (ESG) criteria as well as on our implementation of the due diligence process as it applies to the other three Wilberian (2006) quadrants. These are the inter-subjective quadrant (cultural), the individual interior quadrant (self and consciousness), and the individual behavioral quadrant.

### *Environmental, Social, and Governance Due Diligence*

In our Theta Model, the Environmental, Social, and Governance (ESG) criteria are not considered externalities but are internalized and become concrete measurement criteria for our screening and due diligence process. Our family office was among the first that subscribed to the Principles for Responsible Investing (UN PRI, 2013), which were launched on April 2006 by the UN Secretary General at the NY Stock Exchange. Hence, we agreed to fulfill the following commitments: (a) We will incorporate Environmental, Social, and Governance (ESG) issues into investment analysis and decision-making processes; (b) We will be active owners and incorporate ESG issues into our ownership policies and practices; (c) We will seek appropriate disclosure on ESG issues by the entities in which we invest; (d) We will promote acceptance and implementation of the Principles within the investment industry; (e) We will work together to enhance our effectiveness in implementing the Principles; and (f) We will each report on our activities and progress towards implementing the Principles. Some key ESG criteria are summarized in *Figure 13*.

Environmental Criteria	Social Criteria	Governance Criteria
<ul style="list-style-type: none"> <li>• Climate change, water scarcity</li> <li>• Local environmental pollution and waste management</li> <li>• New regulations beyond environmental product liability</li> <li>• New markets for environmentally-friendly products and services</li> </ul>	<ul style="list-style-type: none"> <li>• Workplace health and safety</li> <li>• Knowledge and human capital management</li> <li>• Labor and human rights issues within companies and their supply chains</li> <li>• Government and community relations</li> </ul>	<ul style="list-style-type: none"> <li>• Board structure and accountability</li> <li>• Accounting and disclosure practices, transparency</li> <li>• Executive compensation</li> <li>• Management of corruption and bribery issues</li> </ul>

Figure 13: Overall Description of Environmental, Social, and Governance criteria.

In our de-risking approach, we include these metrics and are also active in various organizations to help standardize them for general adoption. These include the UN PRI (2013), the IIRC (2013), the Impact Reporting and Investment Standards (IRIS) of the Global Impact Investing Network (GIIN, 2013), the G8 Social Impact Investment Task Force, and the Club of Rome (2013) to name a few. It is important to us to help new start-up companies become integrally sustainable and we use these various criteria to help them do so. We find that the majority of entrepreneurs is truly concerned with sustainability issues and welcomes our inquiries in this direction. They prefer a stakeholder to a shareholder approach when setting up their companies and have rather clear ideas about progressive governance models, which they want to implement in their organizations. They care deeply about sustainability issues such as stakeholder management, ESG strategy and measurement, avoidance of green washing and social washing, as well as reporting tools and standards. Unfortunately, we found that most standardization efforts focus on public companies and there are virtually none or very few tools available for start-up companies. There is a lot of room for improvement in this direction. In our family office we rely on the support of organizations such as PriceWaterhouse Coopers, GIIN, and/or GIIRS/Bcorp in providing start-up companies with the necessary criteria for integral sustainability. We value these tools not only from a short-term de-risking perspective but also from a long-term sustainability perspective.

#### *De-Risking the Team and Individual Leaders: Cultural, Individual, and Behavioral Assessment using the Theta Model*

Any real estate agent would agree that “location, location, and location” are the three most important attributes of a good real estate investment. In a similar way, any experienced high-risk/VC investor would agree that investing in a high-quality management is arguably the litmus test not only for the success of the start-up, but more importantly for the success of the partnership between investor, entrepreneurs, community, suppliers, and other stakeholders. 80 percent of the risk can be addressed by performing an integral due diligence on the team (Figure 14).

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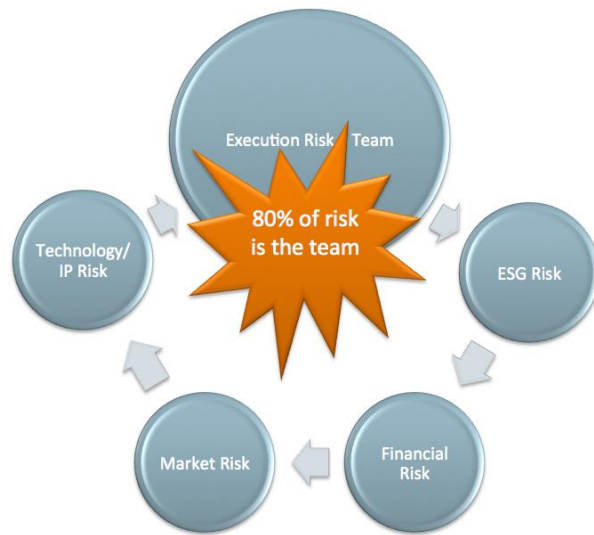


Figure 14: Theta Model: Start-up Risks

Most due diligence tools used by investors to assess individuals and the team of a start-up are frequently limited to assessing exterior factors such as the ones described by social scientists as (a) *mental characteristics* such as “the need for achievement, need for power, belief that one is control of one’s own destiny, and risk preferences”; (b) *behavioral characteristics* that include “*determination, resourcefulness, a sense of urgency to get things done, and a realistic approach to facts*”; (c) *physical characteristics* such as “*energy level, a better than average ability to speak and communicate, and mental stamina*”; and (d) *moral characteristics* such as “*honesty, partnership orientation, and a desire for fair play*” (Gladstone & Gladstone, 2004). The traditional VC assessment process includes individual and team interviews, background checks, personal history assessments, and observing of body language during personal interactions. Some VCs “*resort to personality or psychology tests, but this is not frequently done*” (Wong, 2005). This is unfortunate for both the start-up and the investor side. Given the fact that both parties are actually looking for a mutually fruitful relationship, the results of these tests would help cement the potential relationship and lead it to success. According to research by renowned Harvard scholar Susanne Cook-Greuter, (2004) only 10 to 20 percent of adults demonstrate high ethics and high levels of ego development. Identifying those in a start-up setting would help ensure that what is being promised on the outside is authentically true on the inside. According to CEO-oriented research (Rooke & Torbert, 1998; 2005, April ; Torbert, & Livne-Tarandach, & Herdman-Barker, & Nicolaides, & McCallum, 2008, August 9), performed on 10 organizations over four years by Action Inquiry experts Rooke and Torbert (2005, April), there appears to be a direct correlation between the levels of consciousness of the CEO and the survival of the business. In this research, all five organizations lead by CEOs rated at high ethics levels were transformed into successful businesses; financially and otherwise. Only two of the organizations that were lead by CEOs assessed at conventional levels of consciousness were still around while the others went out of business. Additional research performed on financial service advisors at American Express by leading Stanford researcher and forgiveness expert, Dr. Luskin, (Luskin et al., 2009) “*demonstrated a 50-400 percent improvement in productivity over their peers, which led to an average increase in sales of 25 percent. This was coupled with a marked decrease in*

*stress and a large improvement in life satisfaction.” Moreover, “seminal research into the dynamics of high performing teams reveals the secrets to extraordinary results are what we have intuitively known all along: positivity, inquiry, and a focus on others. High performing teams exhibit a ratio of positive interactions (support, encouragement, appreciation) to negative interactions (disapproval, sarcasm, cynicism) of between 3:1 and 11:1. Such teams also balance advocacy with inquiry and balance a focus on self and others. In layman’s terms, they care about one another and work well together. These behaviors enable the teams to operate in a dynamic flow-like state a bit like a championship basketball team. Medium and low performing teams exhibit lower ratios of positive to negative interactions, favor advocacy over inquiry, and participants focus more on themselves than on each other.” (Brown, 2014). Having this type of data on the entrepreneurs in whom one invested could significantly increase the likelihood of success and reduce the investment risk related to the team. We perform such assessments using various tools (Figure 11) developed at reputable universities such as Stanford, Harvard, and MIT. In Figure 9 we shared the vertical lines of development along which these assessments have been performed in our own family office. However, there are innumerable other tools that can be used within this context.*

### *Lessons Learned*

We have evaluated thousands of deals and invested significant amounts of money in start-up companies over the past two decades. We feel deeply responsible for the integral impact of our portfolio companies due to our intention to create integrally sustainable companies (Bozesan, 2010, 2011a, 2013a) from the very beginning. The Theta Model helps us do that in a much more efficient and effective way. As a result, our portfolio companies (1) solve real customer problems; (2) implement innovative business ideas; (2) have a specific sector focus (transformative technology, climate change, lifestyle, cultural innovation, megatrends); (3) have the ability to massively scale into a worldwide marketplace; (4) are lead by dedicated, resilient, and integrally acting management teams; (5) are committed to integral sustainability criteria including, financial, environmental, social, and governance measurements; (6) display ethical behavior ; (7) create a corporate culture based on higher values and levels of consciousness; and (6) support transparent reporting.

When the investment failed, the reasons were mostly related to factors including the following (1) we failed to identify early enough the lack of team alignment and missing common values of the original team or the team changed and became misaligned over time; (2) the organizations were geographically and culturally located too far away from our immediate circle of influence; (3) the technology was too early and ahead of its time; (4) we neglected the importance of a regulated market; (5) the main founder(s) did not want to exit and thus, we could never retrieve our investment; (6) we were too hands-off; (7) we were diluted; (8) we invested against our intuition and gut feeling; (9) we trusted the entrepreneurs at face value, did not have proper scientific tools to assess moral and ethics, underestimated the importance of proper legal advice and paperwork thus leading to major losses; (10) alternative solutions caught up faster and came to market before ours did; (11) global times of crisis.

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### *When it Failed*

BioCEE is an example for a technology ahead of its time, a geographically remote organization, and a start-up company that did not grow fast enough. The company developed advanced biocatalytic reactor solutions for the production of clean fuels and chemicals based on its proprietary biocoating technology platform. The team was wonderful, integrally informed and acting, but unfortunately for us, who lived between California and Bavaria at the time, it was based in Minnesota, in the heart of USA. As fracking and other fossil fuels began filling the energy gap by providing the necessary energy sources, clean fuels such as those produced by BioCEE became way too expensive. The company's operations were recently closed although it still owns invaluable patents.

ZONARE Medical Systems, an ultrasound diagnostic imaging manufacturer, is another example of an investment in a difficult, too early technology, and a company that could not grow fast enough for several reasons, all factors that unavoidably led to significant dilution for all early investors.

Infobahn Romania, a technology transfer company, is an example of a start-up company that failed due to cultural misalignment of various international teams involved across various countries and continents.

When our investments worked, the Theta Model was applied in full, yet the main key to success was, of course, the team. By the team we mean the whole stakeholder team including the investors, suppliers, start-up team, and other contributors. Our common focus was the cultivation of a stakeholder culture based on trust, interdependency, integrity, transparency, caring, passion, and fun in addition to the desire to be financially and otherwise sustainable. Some of these portfolio companies went public or were sold in less than four years and became highly successful. We still receive calls from former employees telling us how much they loved being part of these organizations. In several cases, the original founders started new enterprises that became again very successful despite the economic downturn of the past decade. These organizations had not only happier employees, and higher customer stickiness, but also significantly higher return on investments than others, which did not build a culture based on higher values.

### *When it Succeeded*

Cybernet AG, a German Internet Service Provider that went public and became the first Internet stock traded on the German stock exchange before PSINet acquired it at the end of 2002. Its visionary and progressive founders and the culture they built fulfilled all characteristics of an integrally acting team highlighted in this paper and previous publications (Bozesan, 2010, 2011, 2013a, 2013b). Furthermore, in a country like Germany it is rather easy to implement high standards with respect to Environmental, Social, and Governance (ESG) criteria. Most of these ESG criteria are mandated by law and are therefore easy for any investor to measure and for the start-up company to report.

Out of our concern for climate change, we invested also in Entelios AG, which became

another success story in our portfolio. Germany's commitment to the Energiewende (energy turnaround) in the aftermath of the Fukushima disaster was an ambitious plan to shift from nuclear and fossil fuels to renewables. Feeding renewable energy sources such as wind and solar into the existing power grid is cumbersome because these energy sources are not continuous. In order to guarantee a reliable and inexpensive energy supply in the future, new solutions are required. Thus, Entelios AG became Germany's first Demand Response aggregator that was acquired in 2014 by global leader EnerNOC, only four years after being founded.

In addition to investing in high technology, biotechnology, and technology that addresses climate change, we continue to invest in other megatrends such as cultural innovation, lifestyle, and medical devices. Penumbra is such a medical device company that develops and manufactures innovative and minimally invasive medical devices for patients who are suffering from strokes and various neurovascular diseases. Although Penumbra has not exited yet, we are thrilled about the technology that addresses a huge medical need, but more so with the founder, a serial entrepreneur and founder of Smart Therapeutics (now Boston Scientific), and his team. Even if Penumbra, or any other of our still active portfolio companies, never returns our investment, we are proud to be part of such advances in human evolution. The Theta Model is our vehicle for self-actualization through investing, philanthropy, and venture philanthropy.

## Summary

In this paper we introduced the Theta Model, a very successful de-risking model used in our own family office since the turn of this century. By sharing the Theta Model, which was developed based on Wilber's (2000) integral theory, we hope to contribute to the increasing aggregation of the needed capital to invest in our future in a sustainable fashion. We hope to contribute to increasing the trust needed to invest in our young entrepreneurs, our economies, our businesses, our financial systems, in our cultural innovation, and in the future of humanity. Much more research will have to be performed to make the Theta Model applicable outside of our own family office with the same success. However, as technological innovation will continue to grow at historical rates, this model could provide an enhanced de-risking tool toward integral sustainability. It could make sure that the available capital is appropriately de-risked to address the new problems that are prone to occur including further resource depletion, increasing pollution, massive climate change, growing inequity, and substantial social conflict. This model could provide the necessary de-risking tools and due diligence processes needed in the transition from a fossil-fueled economy toward a sustainable economy rooted in well being for all humanity. Such a transition may seem like a miracle to some people. However, we believe in the resilience of the human species and our ability to turn crises into opportunities. Ken Wilber's Integral Theory could become the new investment map for large-scale application in an integrally sustainable world.

# DE-RISKING VC INVESTING FOR OUTSTANDING ROI: AN INTERDISCIPLINARY APPROACH TOWARD THE INTEGRATION OF PEOPLE, PLANET AND PROFIT

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## **ESTABLISHING AND ASSURING A RISK CULTURE IN ORGANISATIONS AND SUSTAINING IT OVER-TIME.**

Neill Buck  
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***Abstract:** Why is it important to have a risk culture? How do you embed a risk culture into an organisation and sustain it over time?*

*Risk appetite and culture need to be understood and aligned to provide a basis for reporting and continuous improvement. Managers at all levels need to be made accountable for this. If there is no effective and communicated risk appetite and culture of risk, organisations will be surprised when they fail. If the culture and appetite are not aligned across the organisation then the organisation will have less ability to take opportunities as they arise.*

*Creating a risk appetite will always be done by the board and both process and cultural/behavioural risk will result from this discussion. This must be something that is repeated across the organisation. Leadership and creating a reporting culture will reduce surprises and cause the business to run in an open and transparent manner.*

*Embedding and sustaining a risk culture over time requires retaining the corporate memory, assuring that managers who do not follow the process are disciplined and as appropriate terminated.*

*Importantly this risk culture must carry across borders. Companies that operate in many jurisdictions know that the corporate risk appetite and culture cannot be circumvented in any country.*

*It is difficult to achieve alignment between risk appetite and culture and if you don't manage it your organisation is more likely to fail.*

# ESTABLISHING AND ASSURING A RISK CULTURE IN ORGANISATIONS AND SUSTAINING IT OVER-TIME.

## Introduction

Why is it important to have a risk culture? Why should a risk culture be important to organisations? How do you embed a risk culture into an organisation and sustain it over time?

These are questions that every organisation should ask. The answers are not always the same but the fundamental concepts and processes are common across most organisations. In this paper these understandings and processes are based on this author's research and practice in this field of risk management.<sup>1</sup>

The key is to understand that Directors in any company and not for profit and Senior Officials in government agencies should know that the amount of risk they think are taking is appropriate. Then they must understand the risks the rest of the organisation are likely to be taking. Without this understanding, those at the top will be surprised when things go wrong. Regardless of the amount of risk the organisation chooses to take, without a culture of risk all the best systems will eventually fail.<sup>2</sup>

It is very important to ensure that there is an alignment between risk appetite and risk culture. This this should lead to effective and timely reporting. In the end if a manager or executive treats a reporter badly they will never report again. <sup>3</sup>

It is important to recognise that every organisation has the capacity to fail. Aligning the organisation's risk appetite with the risk culture will reduce the chances of failure. And when you do fail someone will tell you quickly so you can reduce the impact.

Donald R Keogh's book The Ten Commandments for Business Failure<sup>4</sup> tells us how business culture can help a company fail:

- "Quit Taking Risks;
- Be Inflexible;
- Isolate Yourself;
- Assume Infallibility;
- Play the game close to the foul line;
- Don't take time to think;
- Put all your faith in experts and outside consultants;
- Love your bureaucracy;
- Send mixed messages; and
- Lose your passion for work-for life"<sup>5</sup>

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<sup>1</sup> Source author

<sup>2</sup> Based on 25 years of investigations by the author. The author has not seen a business failure that is not linked to risk cultural issues.

<sup>3</sup> Source author

<sup>4</sup> Keogh Donald R The Ten Commandments for Business Failure:: Penguin 2011

<sup>5</sup> Op cit page V1/V11

On the basis of this approach you should adopt the opposite and ensure that your risk appetite and risk culture reduce the likelihood of these issues arising.

Mark Abkowitz in his book on Operational Risk Management<sup>6</sup> starts with a study of a series of critical risk failures. These provide an alarming pattern of commonality that could be prevented if the organisation understands it can fail and addresses the opportunities to take risks using an appetite and culture of risk.

He has prepared a contextual framework for the issues he addresses in his book based on 16 critical events or disasters.

Abkowitz list contains the following:

- “Design and construct flaws;
- Deferred maintenance;
- Economic pressures;
- Schedule constraints;
- Inadequate training;
- Not following procedures;
- Lack of planning and preparedness;
- Communication failure;
- Arrogance; and
- Political agendas.”<sup>7</sup>

An example of a report into a catastrophic even The Report into the Nimrod Crash<sup>8</sup> contains alarming similarities across a range of other events. On page 447 Charles Haddon-Cave QC reports the following common factors across similar incidents:

- “The ‘can do’ attitude and the ‘perfect culture’;
- Imposition of business principles;
- Cuts in resources and manpower;
- Dangers of outsourcing to contractors;
- Dilution of risk management processes;
- Dysfunctional databases;
- Powerpoint engineering;
- Uncertainties as to out of service date;
- Normalisation of deviance;
- Success engendered optimism; and
- The few - the tired.”<sup>9</sup>

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<sup>6</sup> Mark D Abkowitz Operational Risk Management – A case study approach to effective planning and response; John Wiley 2008

<sup>7</sup> Abkowitz op cit page 259

<sup>8</sup> Charles Haddon-Cave QC The Nimrod Review – An independent review into the broader issues surrounding the loss of the RAF Nimrod MR2Aircraft XV230 in Afghanistan in 2006 ; House of Commons 28 October 2009

<sup>9</sup> Haddon-Cave op cit page 447

## ESTABLISHING AND ASSURING A RISK CULTURE IN ORGANISATIONS AND SUSTAINING IT OVER-TIME.

The other critical issues to identify and eliminate from business and government in understanding why a risk appetite and risk culture should be created, communicated and sustained are;

- **Group think** i.e. where the group thinks everything is fine and avoids completion and/or the hard decisions. This represents a lack of perception around the hindsight, insight and foresight risk issues. Rather than using a strategic risk approach they assume nothing can go wrong and do not stop to consider the potential to fail;
- **Lack of defences in depth** i.e. understanding that multi-layered organisational processes and behavioural defences are essential to reduce the opportunities for failure. This is the second cultural risk failure. If the decision makers do not consider both cultural and process risks and do not look at the type of defences in depth required then they will fail. If you have too many defences then nothing will happen but if you do not have enough then you will look foolish;
- **Confirmation bias** i.e. the group confirms a particular bias without stopping to ask why – this is often a failure that occurs in both cultural and process risk management. People think that they are making independent decisions when they are merely confirming their existing biases. Often it is an assumption that all will be well when it is not. This represents both a behavioural and procedural risk process that often informs bad risk decision making;
- **Tunnel vision management** i.e. where the management and the board can only see what they want to see. This is another of the failures in cultural risk. People feel comfortable with what they know and do not bother to ask the “what if?” question. If you do not ask the “what if?” question then you do not recognise your capacity to fail and you will be surprised when you do fail. This type of decision making is a common element in the failures and is common in most of the major enquiries into large corporate failures, corruption, rail accidents, oil fires, plane crashes and similar events that organisations do not expect to occur.<sup>10</sup>

If there is no effective and communicated risk appetite and an effective and communicated culture of risk then organisations will be surprised.

The following is an extract from the Special Commission of Enquiry into the Waterfall Rail Accident regarding State Rail Authority and RailCorp in NSW. This accident resulted in loss of life but more importantly no one expected it to happen. The Royal Commissioner made the following findings in regard to the Board and Chief Executives:

- ‘They failed to implement a system by which each could quickly and readily obtain information as to the overall level of safety in the organisation;
- They failed to have clearly identified measures for determining the level of safety of each organisation and the safety performance of managerial staff;

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<sup>10</sup> Source author

- They failed to have clearly defined and appropriate safety responsibilities and accountabilities included in managerial position statements;
- They failed to have measurable criteria for assessing the safety performance of individuals in managerial positions;
- They failed to have adequate internal auditing systems in place to test the adequacy of the safety management systems in place;
- They failed to use external auditors to test the adequacy of the safety management systems;
- They failed to ensure that the strategic directions and policies of the State Rail Authority were aligned with the executive action being carried out by the Chief Executives and other senior managers;
- They failed to ensure that auditing was carried out and verification received, to satisfy them that the safety related information provided by management was sufficient for them to make informed decisions in relation to strategic policy directions;
- They failed to ensure that all the necessary systems for effective information management, performance measurement, verification and document safety control were in place;
- They failed to communicate to Chief Executives the matters that they reserved for their own decision in the area of safety management, the processes by which they expected to be informed of such matters, and the time frames within which they expected to be informed;
- They failed to determine what they regarded as the bounds of acceptable risk, and to prescribe how events that may lead to unacceptable risks were to be identified and controlled.”<sup>11</sup>

The Board and executive did not think they could fail and hence procedures and a culture that would identify and report issues was missing.

It is a common understanding that in most cases of significant catastrophic events over the past 30 years most people were surprised. There is no reason why they should be surprised if the risk appetite is aligned to the risk culture. But in the majority of cases this simply was not the case.<sup>12</sup>

## **Why Do You Need a Risk Appetite to establish a Culture of Risk?**

Many organisations have a risk appetite statement. In many cases they have done this because they think it is a good idea. Most of these statements are of their nature vague.

What is helpful is the process that the organisation goes through to establish and discuss the risk appetite. This process includes both behaviour and procedural issues and is generally aligned to 10 or 12 key risks at the board or top of agency level. If managers are involved then everyone understands what is expected.

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<sup>11</sup> Final report of the Special Commission of Enquiry into the Waterfall Rail Accident Volume 1 ; The Hon Peter McInerney QC published by the Special Commission of 2005 page iv and v

<sup>12</sup> Source author

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In order to do this exercise the board needs to establish the individual risk appetites of the members and then in turn harmonise that appetite into an appetite of the board. This should involve using a heat map and discussing 10 risks for example; what is catastrophic and what is tolerable procedurally and in terms of culture.

Generally this results in some form of diagram of what the risk means. (see the heat map and likelihood and consequence diagrams below.)

A good way to start this process using one risk is to consider the risk appetite for death of an employee on duty. Generally people say the appetite is zero. Once this discussion occurs you need to point out what are the main causes of death. For example motor vehicle accidents are a major cause of death. But if you have a zero risk appetite for death then you should not allow people to drive a car. This is not realistic but there needs to be some controls. The best illustration is the use of mobile phones. Some companies have a zero tolerance for use of mobile phones in cars. This is an interesting discussion to have because if sales people cannot use their phone in the car then their productivity will fall away. Now we are discussing cost and culture.<sup>13</sup>

This exercise should be repeated throughout the organisation to show that there is an alignment between the risk appetite and the procedural and cultural of risk being taken. Of course at different levels the rating of risks will change but the appetite and culture should flow throughout the organisation. This is an important accountability for all managers.

Finally the alignment across the organisation both in terms of behaviour, culture and procedure should generate reports that give information on the following:

- The extent to which there is alignment;
- Examples where failures occur;
- Processes and controls to reduce the risk of failure;
- Lessons learned from the failure and success; and
- Allowing the organisation to use the risk appetite and risk culture to take advantage of opportunities.<sup>14</sup>

The point is that an organisation that has an aligned risk appetite and risk culture can be in a strong position to take advantage of opportunities. This is because the organisation understands its strengths and weaknesses and is confident that the organisation has a robust reporting framework which encourages success and reports procedural and behavioural failures.

Having embedded a risk culture and risk appetite will give an organisation a substantial competitive advantage. Once directors and senior officers understand this then they will take this seriously. Unfortunately you sometimes need a good failure to open people's eye to this issue. It is significant that many international companies are working hard on this issue and over time it will become normal practice. The challenge is that many people expect

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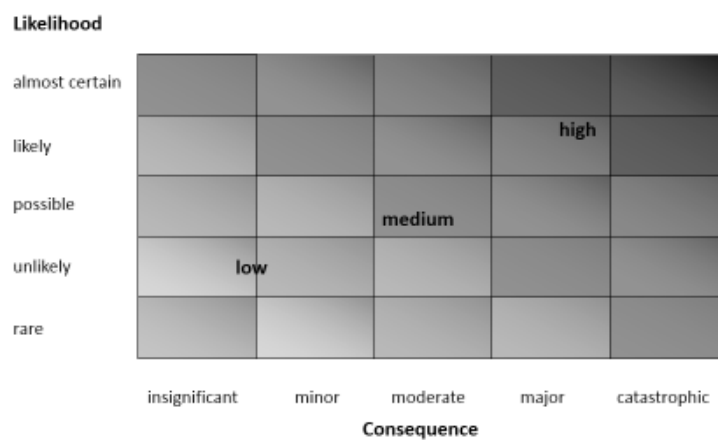
<sup>13</sup> Source author

<sup>14</sup> Source author

procedural outcomes alone to work but without the behavioural domain/culture the procedures are just window dressing.<sup>15</sup>

In some cases such as the banks in the US and UK this is being mandated but for others they see it as a good idea.

It is likely that you will produce diagrams like those below. Please note these are indicative only. The first is a Heat Map. The other tables represent sample likelihood and Consequence tables.



## LIKELIHOOD TABLE

Rating	Score	Description
Almost certain	5	Expected frequency > once per year May happen several times a year with the defined consequence
Likely	4	Expected frequency of once per year May happen once in the next year with the defined consequence
Moderate	3	Expected frequency of once per 10 years Has occurred in the industry with the defined consequence
Unlikely	2	Expected frequency of once per 10 to 40 years Low chance that the situation with the defined consequence will occur
Rare	1	Expected frequency < once per 40 years Possible but very unlikely that the situation will occur with the defined consequence

## CONSEQUENCE RATING TABLE

Rating	Score	Cost (Loss of net income or increase in costs)	Liability	People	Reputation
Catastrophic	5	>\$10m	Third party claim/s >\$10m	Multiple fatalities	Adverse national media coverage
Major	4	\$1m-\$10m	Third party claim/s \$1m-\$10m	Single fatality	Adverse local media coverage
Moderate	3	\$100k - \$1m	Third party claim/s \$100k - \$1m	Multiple serious injuries	Infra-industry knowledge
Minor	2	\$10k - \$100k	Third party claim/s \$10k - \$100k	Serious injury	Concerns raised by clients
Insignificant	1	<\$10k	Third party claim/s <\$10k	Minor injury	Internal knowledge only

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15 Source author

16 Source author. These are indicative examples only and every organisation will be different. Note that typically organisations will have 10 risks that they use to establish an appetite and culture. This exercise should

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### **How Do You Embed a Risk Culture and Sustain It?**

Embedding the risk appetite and creating a culture of risk involves two processes. Procedural arrangements which include reports, controls, auditing and checking. These processes should be informed by the risk appetite and be designed to give the Board comfort that the alignment of the risk appetite across the business is in fact working.

It is also important that the Board Audit and Risk Committee or similar is able to drill into the organisation to ensure that the type of reports are in fact accurate and effective. This should not be seen as undermining the CEO or Managing Director but simply as a second order of assurance for the Board.<sup>17</sup>

It is likely that over time the reports will need to be developed and embedded into the operational arrangement of the organisation. There is no point producing reports that do not reinforce the risk appetite and culture. In the end these behavioural and procedural controls lead to a residual risk rating that ensures that employees do not move outside the appetite and culture. When they inevitably do the executive and board need to be confident that when they report they will be treated fairly. This represents a key part of a risk culture.

From the behavioural domain this is all about establishing and sustaining a risk culture and aligning it with the risk appetite. This does not happen quickly but when it is managed well it can lead to greater confidence in decision making and an enhanced trust and confidence in the organisations operations.

There are many examples of a disconnect between risk appetite and practice. The quote below is indicative of this type of failure.

‘Two independent teams of scientists and engineers investigated the cause of the flooding, and they reached remarkably similar conclusions. The event, they agreed, was a man-made disaster—the result of more than four decades’ worth of mistakes, misjudgements, and misfeasance by the federal agency tasked by Congress to build a hurricane protection system for the city. Had the system worked correctly, one of the investigators said, the worst effect of Katrina on New Orleans would have been “wet ankles.”<sup>18</sup>

This is of course a common example of issues and conduct developing over a period of time. This outcome is common to many reports of rail accidents, plane crashes, bush fires, oil refinery fires and government procedural failure. Like many such incidents the risk appetite of those in charge and others involved were surprised when the issues occurred.<sup>19</sup>

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be done regularly in the boardroom and by managers with their staff. Risks will vary but death of an employee on duty is a good case study as is reputation.

<sup>17</sup> Source author

<sup>18</sup> <http://www.vanityfair.com/culture/features/2010/08/hurricane-katrina-anniversary-201008>

<sup>19</sup> For an example of these issues see Professor Andrew Hopkins books listed in the bibliography.

At its simplest it is a good idea to seek confirmation from those in your organisation at all levels that what the Board thinks is the risk appetite and culture is what others think it is. It is much better to do this than to get a fright.

To identify and quantify a risk culture is not very hard. It can be done in 3 ways. The first by having discussions with employees and their managers and asking them if they have an idea what a risk culture is. The second is talking to risk managers, compliance managers and human resource officers to see what their view is on the organisation's risk culture. The third and most effective approach is through a climate or culture survey.

In any climate or culture survey the following questions should be asked:

- Is it acceptable to report issues;
- If I report will I be treated fairly;
- Will the organisation learn from the reports;
- Can I trust that I will not be victimised for reporting? 20

In most organisations where these question are asked there is an expectation that managers and executives at all level will receive around an 80% result. This may take some time to achieve this. It is important that manager's 3 or 4 times removed from the staff should be included in this arrangement. This means that it is not the immediate supervisor but also the managers 3 or 4 times removed who should be accountable. Otherwise the senior manager just blames the middle manager where in fact it is the senior manager's responsibility to make this work.<sup>21</sup>

Lastly the key element of all risk appetite arrangements is reporting. Reporting should include reporting on procedures but also reporting on behaviours. Where either of these approaches fails then over time the culture will change and the organisation risk of failure will increase.<sup>22</sup>

Risk appetite and culture will work over time but it must involve leadership, communication, reporting and positive reinforcement for those who succeed and where errors occur positive reinforcement for those who report and punishment for those who do not report.

Undertaking a risk appetite exercise before any strategic planning session is essential. This ensures that there is alignment between the strategy and the risk appetite of the Board. If the strategy is not aligned to the risk appetite then it is likely that there will be a disconnect between the appetite, the strategy and the culture. The risk appetite is also critical to understanding strategic foresight i.e. looking to the future and modelling success and failure. Without this alignment the organisational capacity which is informed by the culture will be at odds with what the directors are seeking to achieve. 23

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20 Source author

21 Source author

22 Source author

23 Source author

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Lastly the risk appetite and in turn the culture should be reflected at all levels of the organisation. With this mind it is necessary to train all manager in how to manage the risk appetite and culture and apply it to their part of the business. This leads to the diagram below which will always be informed by the risk appetite of the Board. If people don't report then having a risk appetite is only something that makes the Board feel good.

This diagram below is designed to show how you creating a climate where the reporting of good and bad news is encouraged<sup>24</sup>



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## How Do You Understand a Risk Culture?

The information above gives some insight into this. On the basis of this authors research into culture in organisations and the following represents a reasonable approach to what is a risk culture.

...the PRA expects firms to have a culture that supports their prudent management; rather it focuses on whether boards and management clearly understand the circumstances in which the firm's viability would be under question, whether accepted orthodoxies are challenged and whether action is taken to address risks on a timely basis <sup>26</sup>–

“What marks out a good board is its activism in embedding a strong risk culture throughout the organisation. Behaviours, not structure.”<sup>27</sup> -

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<sup>24</sup> Source author

<sup>25</sup> Source author

<sup>26</sup> UK The Prudential Regulation Authority 2013

<sup>27</sup> John Laker Chair Australian Prudential Regulator Chamber of commerce speech

“... culture refers to a set of internal values shared by a group of people that influence and shape their mindset and behaviour. Culture and values normally define what is proper and what is not. Culture makes people behave in a certain way because they want to behave in that way and not because they have to.”<sup>28</sup> -

Recent issues in banks and other organisations has led to regulators and Boards to look beyond procedures and controls into the area of risk culture.

Erik Banks in his book Risk Culture <sup>29</sup> has set out a series of principles to understand and apply a risk culture.

He uses both structural, governance and behaviour principles. He describes then as imperatives. He uses two categories - **Structural and Governance and Knowledge and Behaviour Change**:

**“Structural and governance issues**

1. Defining a common risk philosophy;
2. Formalising the risk appetite;
3. Assigning accountability;
4. Developing the correct incentives;
5. Building operational sophistication;
6. Rotating personnel
7. Injecting new blood from outside the firm.”<sup>30</sup>

**“Knowledge and behavioural change**

8. Establishing the right tone at the top;
9. Ensuring enough top-notch risk expertise;
10. Ensuring enough business expertise;
11. Reinforcing the 3 Cs communication, co-ordination, cooperation;
12. Demanding common sense, simplicity and clarity;
13. Building credibility;
14. Building credibility;
15. Promoting mutual respect;
16. Developing a risk memory.<sup>31</sup>

Number 16 - Developing a Risk Memory is possibly the hardest issue to address. Business and government are in a constant process of change which is healthy but the risk memory must be retained.

If you read reports into disaster and corporate failures it is apparent that those organisations have forgotten that they can fail or alternatively have not drawn learnings from other people’s

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<sup>28</sup> Norman T.L. Chan, Chief Executive, Hong Kong Monetary Authority

<sup>29</sup> Erik Banks Risk Culture Macmillan 2012

<sup>30</sup> Banks E op cit page 103

<sup>31</sup> Ibid page 123

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failures. This is the risk memory. On the basis of the work of this author without the risk memory then the culture will not succeed.<sup>32</sup>

Some issues that are important in this area:

- Archiving positive and negative risk events;
- Reviewing losses and other critical issues;
- Retaining the corporate memory over time by records or by enabling long term employees to remind us;
- Ensuring that the company and other companies/government's critical incidents and crises are discussed and the learnings applied to the company;
- Remembering the risk culture and considering the consequences of that culture changing over time as it will.<sup>33</sup>

In the end the risk culture is what the organisation decides to create and sustain. It must be aligned to the risk appetite and be reinforced across the organisation.

### **Risk Culture Issues**

Once you have thought about risk culture issues there are a number of critical incidents, events and behaviours that can bring you unstuck. Often these will creep up on you so it is necessary to be diligent in this area. It is important for the Board Risk and Compliance Committee or equivalent to seek information on some of the issues below. Similarly it is critical that compliance and risk staff reinforce the behavioural not just the procedural domain. Lastly if executives or manager choose not to play they should be disciplined financially and as appropriate terminated. Without this serious approach people will play lip service to these issues.

Some of the issues worth watching are as follows:

- Design and construction flaws – IT, manufacturing, internal processes;
- Deferred maintenance - no spend on critical infrastructure i.e. legacy computer systems;
- Economic Pressures – risk aversion;
- Schedule constraints – not enough staff;
- Inadequate training – poor training addressing procedures and not behaviours;
- Not following procedures – lack of accountability or procedures too hard;
- Lack of planning and preparedness – no understanding of what to do when something does not work;
- Communication Failure – poor communication from board, management down and workers up;
- Poor internal controls – either not in place or not understood and/or enforced;
- Political agendas – politics and power more important than performance;

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<sup>32</sup> Source author

<sup>33</sup> Source author

- Group think – not allowing people to deviate from the group’s view;
- Lack of strategic foresight – not seeing tomorrow only focussing on today and yesterday;
- Failure to recognise capacity to fail – not picking up near misses and early warning signs;
- Lack of defences in depth – not having defences to stop the event and importantly mitigation controls after the event;
- Poor leadership – lack of dynamic and inclusive leadership;
- Arrogant leadership – I am always right;
- Lack of inclusiveness – not engaging staff and those who know things in decision making and reporting;
- Poor culture of reporting – people who report bad news are ignored or punished, people who report are not treated differently to those who don’t report;
- Poor quality reports i.e. not providing useful information;
- Lack of alignment between risk appetite, strategy and operations – if no one knows how much risk we can take then there will be no alignment across the business;
- A culture of secrecy – people are reluctant to share as it gives them authority or they are afraid to speak up;
- Punishment of those who report; not taking internal and external complaints seriously;
- Regulatory capture i.e. lack of resources, independence and competence – regulator incompetent or captured by the industry, test do they prosecute individuals or just give corporate undertakings i.e. operate without fear or favour or just pick on the little guys.
- Lack of accountability by stakeholders, the media and regulators – we are too big to care and if you do anything to us we will tie you up in court for years.<sup>34</sup>

## **How Do You Embed and Test a Risk Culture?**

There are a variety of ways to maintain and test a risk culture. The key to each of these is asking the right questions and aligning each of these processes to the risk appetite and ultimately the risk culture. It may be that you have a deficit in just one but that should be a trigger to consider others. In the end senior managers who listen to their organisations i.e. “the way we do things around here when no one is looking”, will find that staff will report. But of course if you give those who report a hard time and undermine them then no one will report and you will get a fright.<sup>35</sup>

As an investigator it is most unusual for someone not to have reported an incident issue or fraud. Sadly many organisations do not believe it can happen to them.<sup>36</sup>

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<sup>34</sup> Source author

<sup>35</sup> Source author

<sup>36</sup> Source author

## ESTABLISHING AND ASSURING A RISK CULTURE IN ORGANISATIONS AND SUSTAINING IT OVER-TIME.

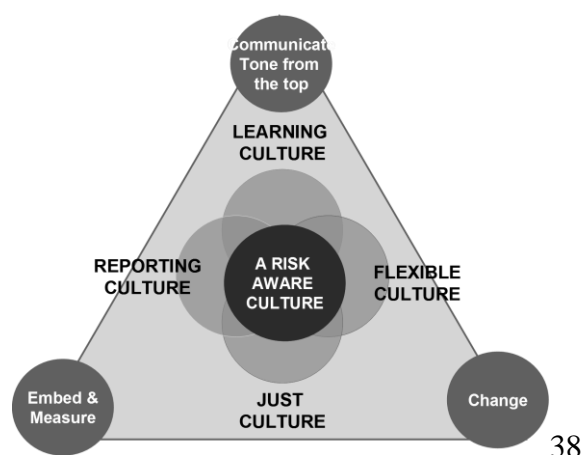
Some of the tools you can use are as follows:

- Culture Surveys (measure behaviours)
- Performance Measures (drive behaviour)
- Objectives (drive behaviour)
- Incentives (drive behaviour)
- External Audits (measure behaviours)
- Internal Audits (measure behaviours)
- Encouraging reporting and feeding back to the reporters to thank them for their work (drives behaviours and provides early warnings that you have a problem)
- KPI / Dashboards / Heat Maps (measure behaviours)<sup>37</sup>

Short term and long term measures are imperative when measuring success or failure of a risk culture. You have to look over time to see trends. Just doing short term fixes is often confusing and not helpful for significant issues like risk culture

### How Do You Sustain the Culture Over Time?

This diagram below represents an example of how this can be sustained. In the end you want to create a risk aware organisation. You should have staff who are aware of their capacity to both fail and succeed. Also there are people who know things that you don't. If you approach the situation carefully they will tell you. If you don't then you will get a fright.



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<sup>37</sup> Source author

<sup>38</sup> Source author -

The key to this diagram is understating that the tone at the top is important. This tone must be reinforced by managers at all levels. If you have a risk aware culture and a reporting culture then you will have a just culture. A just culture is where you treat those who report better than those who do not report and the sooner they report the better they will be treated.

It takes a long time to create this culture and it only takes one person to give reporter a hard time or just to treat them with what they see as contempt to lose it. In less than 2 years where you stop reports being made organisations will have a major failure because no one was prepared to report. Just ask someone who works in a company where they treat reporters well and better still where they treat them badly. In many countries unfortunately we have many more of the latter than the former.<sup>39</sup>

### **What Are the Early and Late Warning Signs of Cultural Failure?**

There are many ways of identifying the early warnings signs of success and failure. This has been discussed above. Understanding early and late warning signs is an important discussion to have at the Board and amongst executives, risk managers and compliance managers.

One of the more interesting diagrams that illustrates this process was drawn by Charles Haddon-Cave QC in his report into the Nimrod Crash.

In this diagram he uses a bow tie and Reason's Swiss cheese model<sup>40</sup>. In this case it is applied to the Nimrod accident<sup>41</sup>

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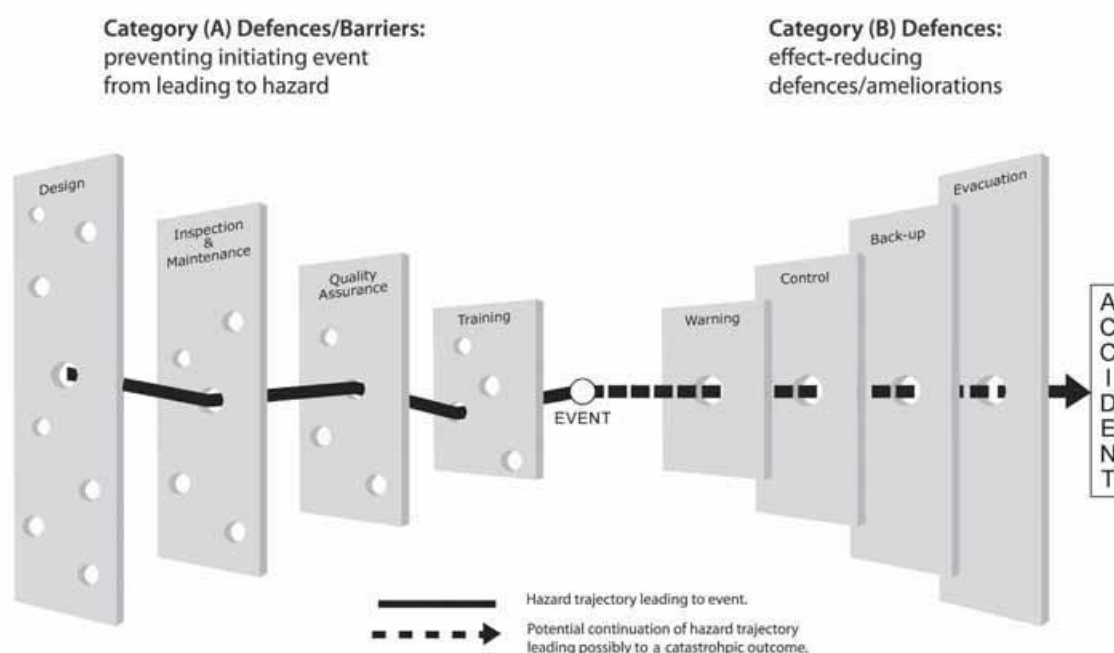
<sup>39</sup> Source author see also Reason J **Managing the Risk in Organisational Accidents** Ashgate 2006

Weick Karl E and Sutcliffe Kathleen M **Managing The Unexpected - Resilient performance in an age of uncertainty** Wiley 2007. These authors provide a framework for this thinking.

<sup>40</sup> Reason J **Managing the Risk in Organisational Accidents** Ashgate 2006 Page 12

<sup>41</sup> Haddon Cave op cit page 449

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The thing about this diagram is that it acknowledges the capacity to fail regardless of the controls but builds the same model after the event. It is a clever way to help understand why failures occur. It is important that on the front side and the after the event side reporting should be one of the controls. Of course the other control on the front side must be recognition of the capacity to fail and on the after the event side a recognition that mitigation controls will substantially reduce the impact of the event.

This approach is common in most of the major reports written about incidents. This author has undertaken around forty such reports where the issues are remarkably similar.<sup>42</sup>

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<sup>42</sup> Source author (most of these reports are subject to confidentiality deeds)

## Conclusion

So what do we conclude from this discussion? Firstly it is difficult to achieve an alignment of risk appetite and risk culture and once you have achieved it is really easy to destroy it. But it is worth the effort.

The processes outlined above are designed to give some insight into creating a risk appetite, aligning the risk appetite and culture across the business by creating procedures and behaviours. Behind this commitment, demonstrated by the board and managers is encouraging reporting and treating those who report fairly. You must have direct and indirect reporting arrangements and make it clear that you will protect those who bring to you significant issues from punishment. This is hard but worth the efforts. If you do not do this no one will ever report.

Culture is something that carries across international boundaries. In some jurisdictions the attitude is different. In some countries where the bosses are very important they do not think they can fail. This is not true. In some countries where corruption is a challenge it still does not mean that a multinational company should accept this. If it is too hard they should not operate in that country. It is essential that companies retain their core values wherever they work. Senior staff who say that this is too hard should be terminated as that attitude will only bring the company into disrepute.<sup>43</sup>

So the following represent what are a simple set of 10 Risk Culture Rules that are easy to remember not too hard to apply and provide an excellent memory jogger when you are confronted with poor culture:

**“1. Nothing focuses the mind like a big fraud.**

- Learn from breaches, incidents and near misses – failure to learn is the biggest failure of all.
- If you think this is expensive wait till the plane crashes.

**2. Speak up and be honest.**

- If you know it is too risky, can't be done or just plain wrong speak up - no one will thank you when it all crashes.

**3. Reality is better than any simulation.**

- Models are only models so the closer to reality your simulations and training come the better – real life is better than multiple choice.

**4. Standard operating procedures drive success.**

- Good habits, standard procedures and embedded good practice works – chaos just makes the crisis bigger.

**5. Beware of unintended consequences.**

- Beware of people who want to simplify complex processes and who don't listen to good advice - be wary of the chasm between cause and effect.

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<sup>43</sup> Source author

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### **6. Stuff happens.**

- Make sure you are not surprised when bad things happen no matter how good your systems and controls are - there are always the lurking known unknowns and unknown unknowns.

### **7. Risk and Compliance Managers need loud voices and thick skins.**

- Make the tough calls and communicate them up and down - don't take it personally.

### **8. Systems and procedures are only as good as the behaviours of those working in them.**

- The best systems are also people dependent – find the right culture and embed it.

### **9. People are rarely fully committed unless they also know it will hurt if they don't.**

- Robust systems and good behaviours need to be supported by accountability – but carrot should always come first before the veiled big stick. It must be made very clear by the Board and senior managers that failure at all levels where it could have been prevented will not be treated lightly.

### **10. Don't forget to remember why you put the systems and controls in place in the first place.**

- Avoid the short term memory loss that allows you to discount the risks and repeat the mistakes of the past – nothing focuses the mind like a big fraud - start again at 1 above.<sup>44</sup>

There is always more to do with culture and embedding it into the business. In the end someone has to tell the Board or Senior Executive that this is not negotiable. Organisation's that don't bother with risk appetite and risk culture and aligning the two across the organisation will be probably be less creative, productive, secretive and less likely to be able to apply strategic foresight and insight to their organisation. It is necessary to carry this culture across borders and sustain it. There is nothing wrong with taking risks but it must be clear to all that it is unacceptable to move outside the risk appetite and consequently the organisation's risk culture.

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<sup>44</sup> Source author

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# A PRACTICAL APPROACH TO BUSINESS UNIT HURDLE RATES, PORTFOLIO ANALYSIS AND STRATEGIC PLANNING

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**Abstract.** *During the course and scope of our work as corporate finance advisors and researchers we have encountered a number of executives who struggle with their current methods of estimating business unit hurdle rates, and their methods of evaluating business unit portfolios. A number of these executives subjectively picked a hurdle rate--many times between 10 to 15%--without engaging in any form of analysis. Worse, some employed formal analysis merely to "back into" a desired hurdle rate. To address situations like these, we adopt a well-known financial model and modify it for use in a business unit context through the use of a strategic accounting beta. Significantly, we also recast and simplify the mathematical expression of the model, which provides a level of transparency to the model that makes it easier for corporate finance and strategy executives to understand and therefore use. It also facilitates a practical form of portfolio analysis, which can be used in conjunction with various capital budgeting methods to question certain strategically significant assumptions, as well as to inform and direct more mathematically rigorous forms of analyses. The linkage between the two approaches--hurdle rate estimation and portfolio analysis--was found to be very useful in strategic planning processes where, in order to secure the requisite funds to execute a business strategy, the objective is to show how a business unit can meet (and hopefully exceed) a given hurdle rate.*

**Keywords:** *Hurdle Rates, Portfolio Analysis, Strategic Planning, Capital Allocation*

**JEL classification:** *G30; G31; L10; L11*

## Introduction

Portfolio analysis helped to usher in the modern eras of both strategy, via the popular share-growth matrix (Henderson, 1979), and finance via the mean-variance framework (Markowitz, 1952). Contrary to relatively high expectations, both approaches produced mixed results: many corporate diversification programs were effectively reversed in the 1980s, and financial models were heavily criticized following the financial crises of 1987, 1997-1998 and 2007-2008. Nevertheless, many firms continue to be structured as some form of holding company thereby requiring the allocation of capital across a portfolio of business units via some form of strategic planning process. Such processes typically involve a business unit creating a strategy to satisfy a

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consumer want or need, which is expected to generate a return that is at least equal to that required (i.e., a hurdle rate) in compensation for the use of the holding company's capital. In this paper, we consult many historically seminal works from a cross-discipline (corporate finance and corporate strategy) perspective to create a practical approach for estimating business unit hurdle rates as well as a related approach for analyzing a portfolio of business units at the holding company level, the output of which can be used to practically inform strategic planning processes.

By way of background, Coase (1937) observed that firms are effectively created to bring select market activities private, or under an enterprise's direct management and control, in the hopes of better or more economically directing production activities. The result of these activities is some form of product/service offering for which it is expected that consumers will pay a price at least equal to (and hopefully in excess of) total production costs, including the opportunity cost of capital thereby generating *residual income* (Fruhan, 1979; Stewart, 1999 [1991]).

Many firms--even those that concentrate on a specific industry--consist of portfolios of businesses units that typically produce different products/services. For example, consider an insurance holding company that is composed of business units that offer various kinds of insurance such as that for automobiles, homeowners, life, commercial liability, workers compensation, etc. While all of these products fall under the same industry classification (insurance) they are all very different and thus may require the governance of specialized business units.

Reasons why a firm would want to diversify across a broad array of products/services pertain to revenue opportunities (e.g., cross-selling, up-selling), cost control (e.g., reduced selling, general and administrative expenses), economies of scale (e.g., fixed costs, marketing expenses), or any combination thereof. To realize the value of such strategies, many firms are organized as holding companies, and they regularly employ some form of strategic planning process (Martin, 2014; Mintzberg, 1994), the findings of which can be used to allocate a firm's capital over some given duration (one- and five-years seem to be the most popular). Many of these processes have, over the recent past, been stretched due to the volatility of the 2007-2008 global financial crisis and the resulting influx of capital that many firms experienced due to the easy money policies enacted in response to that crisis. This volatility can be seen, for example, in short-term Commercial and Industrial Loans in the United States as illustrated in Figure 1.

Some corporate finance executives are using this situation as a catalyst to reevaluate their firm's strategic planning processes, and the analyses that inform those processes, particularly in the areas of: (1) business unit hurdle rates as no readily acceptable models are available to inform the estimates of such rates, and (2) portfolio analysis given the multitude of approaches that can be used to perform such analysis. In this paper, we approach both of these topics from the same perspective; namely, from the relationship of a business unit's performance to that of its holding company as measured by core strategic metrics and related statistics.

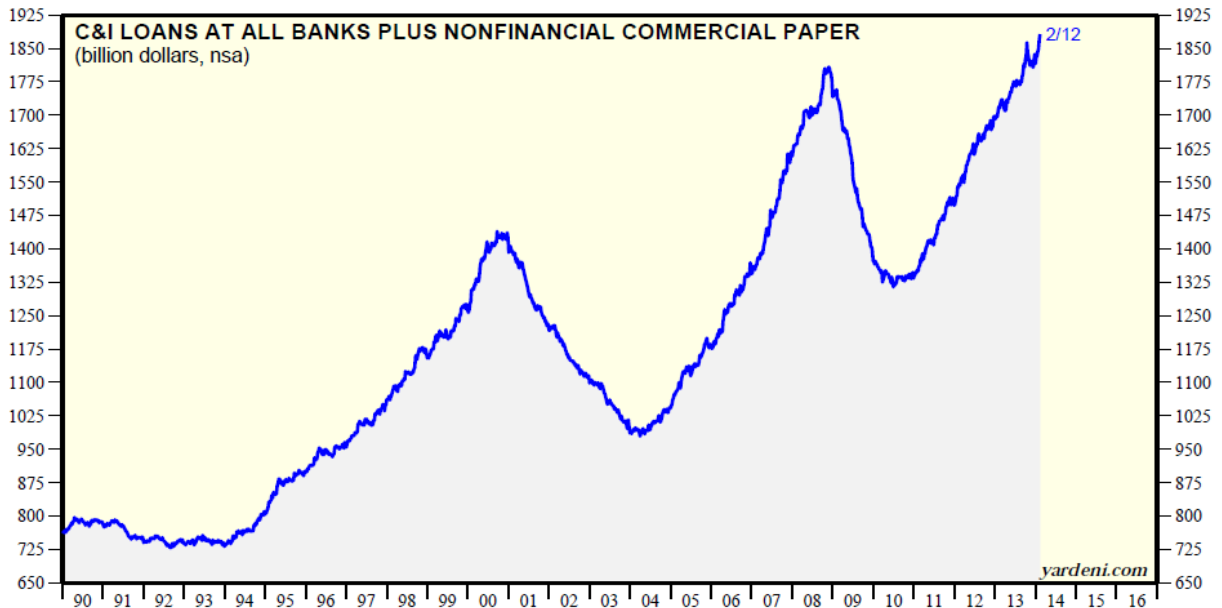


Figure 1: Commercial & Industrial (C&I) Loans: 1990 – 2014

Data sources: Board of Governors of the Federal Reserve System and Yardeni Research, Inc. Observe that C&I loans are at twenty-plus year highs. See Ryan (2014) for an example of the practical implications of this environment (p. 22).

## Business Unit Hurdle Rates

Hurdle rates are, like value, inherently subjective and thus are based on estimates. Models such as the capital asset pricing model (CAPM; Sharpe, 1964) often serve as the basis for hurdle rate estimates at the holding company or enterprise level. This model is effectively built on two core variables: a risk-free rate, which is the nominal return of a security that has absolutely no possibility of default, and a risk premium for exposure to the risk of the broader market that cannot be diversified away:

- A typical proxy for the risk-free rate is the yield of U.S. securities such as the 10-Year Treasury-Note. To this rate would be added any related Credit Default Swap (CDS) spread, which together effectively give a "risk-free rate." Regarding the use of CDS in this estimate, which is not traditional, given the current global monetary environment it behooves corporate financial analysts to account for market-derived default estimates in their "risk-free rate" assumptions.
- The risk premium is a function of a market premium, which is the expected excess return of the broader market over the risk-free rate, and a risk multiplier, which is based on the covariance of a firm's securities' prices to those of the broader capital market and is popularly known as beta.

• Three of the above four parameters are fairly easy to estimate: data for the risk-free rate are available from a broad array of vendors, and estimates of the market premium are available from a number of researchers (e.g., Morningstar, 2012; Fernandez, Aguirreamalloa and Corres, 2012).

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Data to derive beta estimates are also easy to obtain, but the use of beta has generated much more controversy than the other parameters. At the center of the controversy is the question of whether relative securities' prices are the right basis to measure risk. For an example of the criticism from highly successful financial practitioners see Warren Buffett's thoughts contained in the 1993 *Berkshire Hathaway Annual Report* (<http://www.berkshirehathaway.com/letters/1993.html>). To address this controversy, some firms employ the multi-factor models of arbitrage pricing theory (APT; Ross, 1980), and such models have achieved some level of popularity (e.g., Fama and French, 1992). Whatever approach is chosen, at least models are available to inform hurdle rate estimates at the enterprise level in contrast to the situation that exists at the business unit level.

During our work as corporate finance advisors and researchers we have encountered a number of corporate finance executives who struggle with their current methods of estimating business unit hurdle rates. For example, we have encountered executives who subjectively picked hurdle rates--many times between 10 to 15%--without engaging in any form of analysis. Worse, some have employed formal analysis merely to "back into" a desired hurdle rate. These situations are problematic because setting an appropriate hurdle rate is a critically important corporate finance function: set too low, a firm will take on too many projects and initiatives with the likely result of destroying value over time. Set too high, and a firm runs the risk of passing over value creating projects and initiatives. Thus, the stakes of selecting appropriate business unit hurdle rates are strategically significant.

The two main approaches of estimating business unit rates are to estimate the beta of the CAPM, or the factors of APT, based on comparable statistics from publicly held firms similar to the business units being analyzed, or to employ the use of an *accounting beta* or accounting factors (Damodaran, 2006). An accounting beta substitutes an accounting variable for securities' prices as the basis for the risk regression. The rationale for this approach is that key accounting outputs such as earnings (Damodaran, 2006) or metrics like return on assets (O'Brien, 2006) more directly align with the fundamentals that lead market behavior and thus are an appropriate basis for the beta of a hurdle rate calculation based on the CAPM.

Firms structured as holding companies are effectively mini-markets in which their respective business units compete for resources (including capital) in much the same way that firms on the market compete, albeit in concentrated form. And, much like a public market, a key basis of this competition is expected profitability, all the more so when competition is contained within a firm given the absence of market pricing. Earnings are, of course, the ultimate measure of performance, but profitability can be a much more useful analytical measure, especially operating margin, which is often heavily used in corporate financial and strategic analyses. Additionally, we have observed that many business units do not have detailed balance sheets thereby complicating the use of metrics like return on assets. As such, we typically use operating margin as the basis for our accounting beta.

We base our business unit hurdle rate approach on the CAPM because this model is very popular with corporate finance professionals (Graham and Harvey, 2002), but we have recast the mathematical expression of the model. To explain, we do not employ the traditional covariance-variance method of calculating beta but rather employ a volatility ratio-correlation coefficient approach. Our rationale for expressing the model in this manner is that many executives have difficulty visualizing how statistics like covariance and variance apply to both their businesses and the returns required of those businesses, in contrast to statistics like volatility and correlation, which they do understand and frequently manage to. For example, corporate executives often

expect business units that are experiencing significant margin expansion (i.e., increasing volatility) to produce similar results, and they also typically expect units that are experiencing significant margin compression (also increasing volatility) to improve their performance. By way of background, *volatility* refers to variation over time as measured by standard deviation and has no direction; meaning, it does not indicate whether something goes up or down, just how variable it is over time.

Corporate managers also tend to expect business units that are positively correlated to a holding company to perform at a level commensurate with the company, while they may give negatively correlated business units time to develop and grow given the "diversification benefits" generated by those units. By way of background, *correlation* is the degree to which two or more quantities are linearly associated. Correlation does not imply causality (which is significant for strategic planning purposes as we will discuss). The metric used to measure correlation is the correlation coefficient, which can have a value between +1 and -1. The larger the numeric portions of the coefficient, the stronger the correlation. The sign indicates positive or negative correlation: positive when both quantities move (increase or decrease) in the same direction and negative when they move in opposite directions. The absence of correlation is indicated by a correlation coefficient of 0.

We discuss corporate finance uses of volatility and correlation for strategic planning purposes later in this paper; for now, we will formally express our model noting that for purposes of this introductory exposition business unit hurdle rates will be calculated on an all equity basis and in a single currency. Debt can easily be included in actual analyses by taking a weighted average of the capital structure to estimate the weighted average cost of capital (WACC), and O'Brien (2005) explains how to estimate consistent costs of capital across currencies in integrated financial markets.

$$h = R_F + [(v * r) * MP]$$

where

$h$  = business unit hurdle rate

$R_F$  = risk-free rate = Treasury Note Yield plus the CDS spread

$v$  = volatility ratio = sample standard deviation of a business unit's operating margin / sample standard deviation of the holding company's operating margin. Our relativity is based on holding company performance, but peer group performance, industry performance, etc., could be used in lieu of holding company performance if management deems those bases more relevant. A full discussion of this topic is beyond the scope of this introductory paper and thus is a topic for additional research.

$r$  = correlation coefficient of a business unit's operating margin to the holding company's

$MP$  = market premium

Note: The traditional expression of an accounting beta is  $\text{cov}_{U, F} / \text{var}_F$  or the covariance of the business unit's operating margin and the holding company's operating margin divided by the variance of the holding company's operating margin. The two expressions, the traditional one and our above version, obviously produce the same result.

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The benefits of our expression are that it is easy to use, and its business logic is easy to understand, because it is based on parameters that many corporate finance professionals regularly work with; namely, operating margin, volatility and correlation. Nevertheless, models should generally be used to inform decision-making, not to automate decisions. Failure to adhere to this seemingly obvious point has caused, or contributed to, many flawed financial decisions both recently (e.g., Lowenstein, 2010) and historically (e.g., Lowenstein, 2000), and it could also result in flawed business unit hurdle rate decisions. For example:

- Consider the case of negatively correlated business units: based on our above expression, the statistics of such units result in a negative accounting beta and thus a hurdle rate that is less than the risk-free rate. This is obviously not correct because business units exposed to the marketplace are exposed to risk that cannot be diversified away thereby necessitating a premium to a risk-free rate, not a discount. To address situations like this we establish a minimum hurdle rate as we explain in a below example.
- We typically use twenty quarters of data to calculate business unit hurdle rate estimates: with business units operating less than twenty quarters, such as start-up and immature business units, a number of analytical alternatives are available--including market or peer-group statistics--to estimate a hurdle rate. Alternatively, techniques such as venture capital analyses or simulation could be used to inform such estimates. Therefore, we have observed relatively few business units for which the required information, in some form or fashion, are not available to practically estimate hurdle rates.

Table 1: Business Unit Hurdle Rate: Detailed Example

<u>Calculation</u>			<u>Notes</u>
(a)	1.9%	10-Year Treasury Note Yield	<u>Data source:</u> <a href="http://www.bloomberg.com/markets/rates-bonds/government-bonds/us/">http://www.bloomberg.com/markets/rates-bonds/government-bonds/us/</a> , 1/10/2013
(b)	0.4%	CDS Spread on the 10-Year Treasury	<u>Data source:</u> S&P Capital IQ, 1/10/2013
(c) = (a)+(b)	2.3%	Risk-free Rate	
(d)	0.9	Unit's Operating Margin Volatility	Sample standard deviation, 20 quarters
(e)	0.4	Firm's Operating Margin Volatility	Sample standard deviation, 20 quarters
(f) = (d)/(e)	2.2	Volatility Ratio	
(g) = (d),(e)	0.7	Correlation Coefficient	Derived over 20 quarters
(h) = (f)*(g)	1.5	Accounting Beta	
(i)	6.0%	Market Premium	<u>Data source:</u> Morningstar (2012)
(j) = (h)*(i)	9.2%	Risk Premium	
(k) = (c)+(j)	11.6%	Business Unit Hurdle Rate	

Note: all calculations are subject to rounding.

An example will serve to demonstrate the utility of our approach. Table 1 is based on an actual analysis that has been scrubbed and disguised to protect the identities of both the business unit and its holding company. As the table illustrates, the mechanics of our business unit hurdle rate calculation are very straightforward. Therefore, we will continue with the example by adding other business units to the analysis. The data used in the continued example is a synthesis of three actual analyses that have also been scrubbed and disguised to protect the identities of the

respective business units and their holding companies. For space considerations we have limited the example to four business units within one assumed domestic holding company. International business units could involve foreign exchange effects, which as noted previously is a topic beyond the scope of this introductory paper, but is a topic addressed by O'Brien (2005).

Table 2: Business Unit Hurdle Rate: Multiple Units

Business Unit	Volatility Ratio	Correlation Coefficient	CAPM	Hurdle Rate	Mean Operating Margin
BU-1	0.7	-0.2	1.5%	4.3%	6%
BU-2	0.9	0.6	5.4%	5.4%	8%
BU-3	2.2	0.7	11.6%	11.6%	17%
BU-4	1.5	-0.4	-1.3%	4.3%	12%

Note: all calculations are subject to rounding.

The hurdle rate for the third business unit in Table 2 (BU-3) was the subject of the calculation illustrated in Table 1, and the hurdle rate for the second business unit in Table 2 (BU-2) was similarly calculated. Issues arise with the first and fourth business units in the exhibit (BU-1 and BU-4, respectively) because they are negatively correlated. As defined here, a business unit is negatively correlated if its operating margin behaves differently than its holding company's over time. Examples can be found in the accident, health and life business units of some property and casualty insurance companies, the consumer finance business units of some industrial holding companies, etc. Indeed, many holding companies allocate capital to such business units precisely because of the "diversification benefits" of low-to-negative correlation when such benefits are assumed to be sustainable. Therefore, to address the calculation issue with such units we typically establish a minimum hurdle rate as a function of the risk-free rate, which in Table 1 was estimated at 2.3% (note (c)), and some portion of a market premium, which we subjectively estimated at 2% or one-third of the estimated 6% market premium that was also estimated in Table 1 (note (i)). Some may find subjective adjustments like these troubling; if so, we note once again that hurdle rate estimates, like estimates of value, are inherently subjective. Furthermore, this type of adjustment has precedence with certain successful financial executives including, according to Hagstrom (2014), Warren Buffett, the popular Chairman and CEO of Berkshire Hathaway (p. 66). This is not to say that more quantitatively intensive methods are not available to inform such adjustments; only that the value of such methods is suspect if decision-makers at both the holding company and business unit levels do not agree with, or understand, the methodological logic.

As an example, we have observed that some practitioners use value-at-risk (VaR) models and resulting *economic capital* metrics to estimate hurdle rates (e.g., Oliver Wyman, 2007). Economic capital is simply the difference between a modeled loss at some level of confidence and an expected loss. We do not follow such an approach due to statistical challenges with VaR, especially during times of distress (Taleb, 2005 [2004]; Lowenstein, 2010 and 2000), and the confusion that many of our client executives have experienced working with VaR. One source of confusion is the relationship of volatility and risk, which are *not* the same thing: volatility is

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measured by standard deviation, as noted above, while *risk*, as Klarman (2009) has explained, is “the probability and amount of potential loss” (p. xxxviii). Combining these two very different things into one “risk-based” measure has resulted in flawed financial decisions as reflected in both the 2007-2008 financial crisis (e.g., Lowenstein, 2010) and the 1997-1998 financial crisis (e.g., Lowenstein, 2000). Analyzing them separately, however, has facilitated many successful investments. For example, Klarman (2009) observed that “a volatile stock may become deeply undervalued, rendering it a very low risk investment” (p. xxxviii).

### Portfolio Analysis

Following our use of the CAPM to estimate business unit hurdle rates, it is logical to extend the analysis to the portfolio level via the mean-variance framework given the relationship of the two approaches (i.e., asset pricing theory and portfolio theory) in modern financial economics. In a corporate finance context, the mean-variance framework has the benefit of being very visual and therefore potentially useful for strategic planning. In fact, our expression of the CAPM lends itself to this type of analysis as Figure 2, which was constructed from the data contained in Table 2, illustrates.

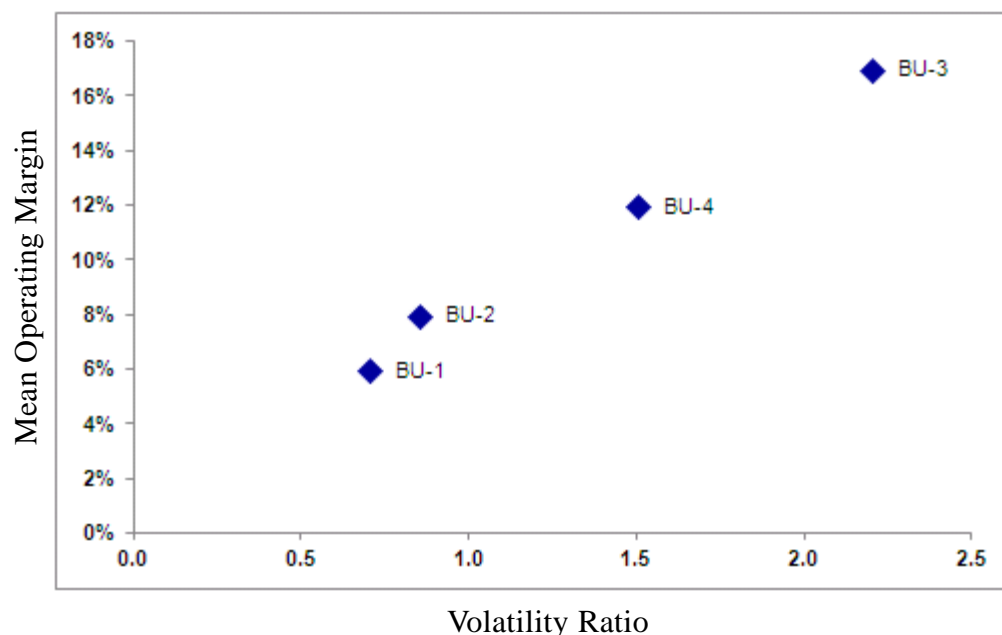


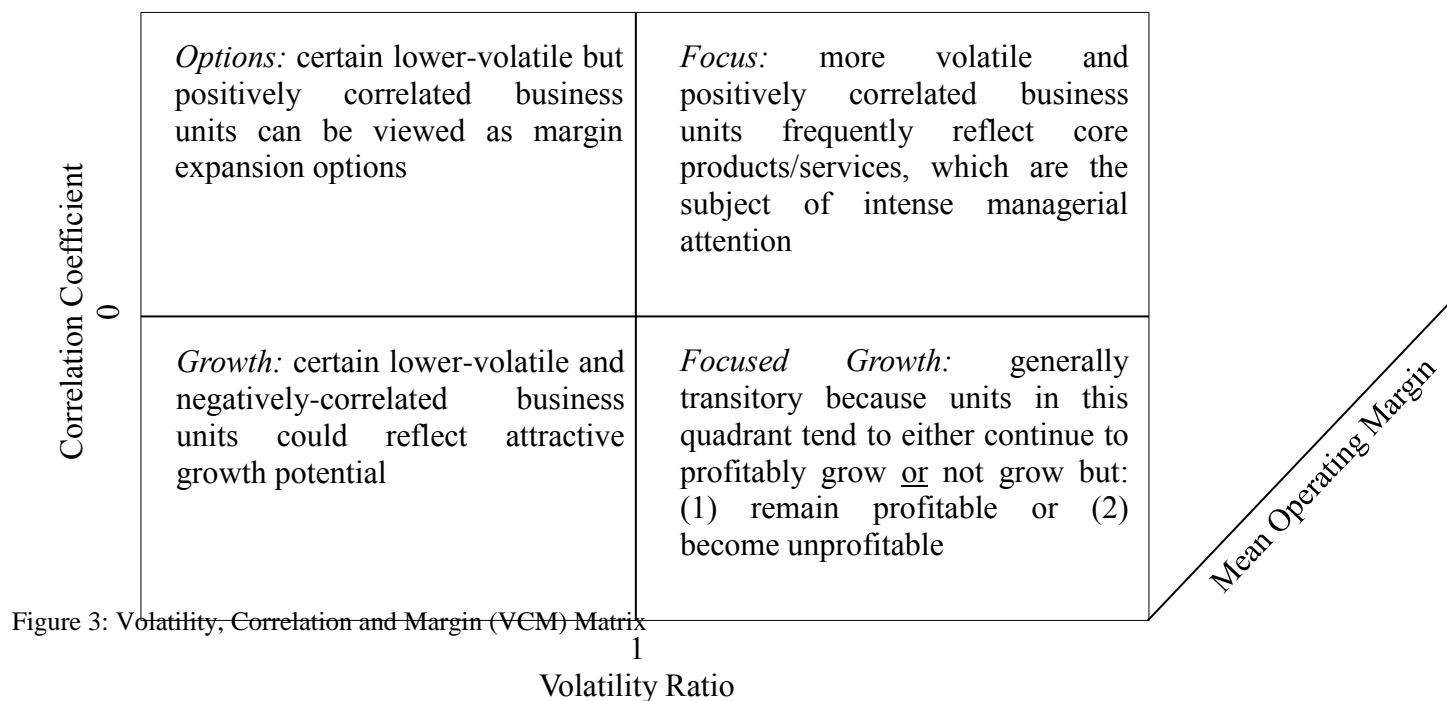
Figure 2: Portfolio Analysis: Mean-Variance Example

Figure 2 visually, which is to say qualitatively, portrays a relatively efficient frontier that suggests the business units seem to be profitable at levels commensurate with their relative volatilities. But is such a suggestion strategically significant? If it is, what are the planning and funding implications of it? Furthermore, is this kind of suggestion all of the strategic insight that portfolio analysis can provide? If it is, the benefits seem relatively limited from a strategic planning perspective. To explain why, consider that one benefit of the holding company structure is that optimally designed business unit portfolios should be worth more than the sum of the individual units. Examples of why this is so include the diversification benefits of low-to-negatively correlated business units and the option value of certain other business units (i.e.,

lower volatility ones) based on the influence that volatility has on option pricing (Black and Scholes, 1973). In fact, both of these subjects are frequently addressed in strategic planning processes, which tend to be informed by a variety of analytical output. This output is frequently summarized in a narrative, which is anchored to some form of forecast that serves as the basis of capital allocation requests. We have found that the analyses conducted to inform these requests could be improved upon when they are linked via a common framework. Such a linkage, for example, facilitates the generation of pointed questions, the answers to which help to inform and direct the need for more mathematically rigorous forms of analysis. Typical questions posed to business unit executives during strategic planning processes include the following:

- Why did you prioritize the growth opportunities of your business in the manner you did?
- To what extent are your claimed diversification benefits real and sustainable, and how can they be practically tracked?
- The concept of "real options" makes a great deal of intuitive sense but the analyses surrounding claimed optionality are far less intuitive. How can we tell which business units really do have "option value," and when and why that value should be exercised?
- To what extent does your analysis provide insight into potential competitive risks, and how those risks can be strategically managed?

Before considering how to practically address questions like these within a common framework, first recall that our hurdle rate model employs a volatility ratio-correlation coefficient approach and observe that how we used each of these statistics result in natural bounds; namely, a volatility ratio of less/greater than one means that a business unit is less/more volatile than its holding company, and a correlation coefficient of less/more than zero means that a business unit moves in a different/the same direction as its holding company. Combining these two statistics produces a two-by-two portfolio matrix, to which we can add a third dimension--profitability--by way of mean operating margin. Figure 3 outlines the basic strategic planning characteristics of this matrix, which is a new addition to the strategic matrix literature (Lowy and Hood, 2004).



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To demonstrate the utility of this matrix, we will continue with our example by graphically displaying in matrix form the volatility, correlation and margin outputs of Table 2, and then we discuss our strategic findings that will include the identification of pointed questions and/or analytical considerations that can be used to inform strategic planning processes.

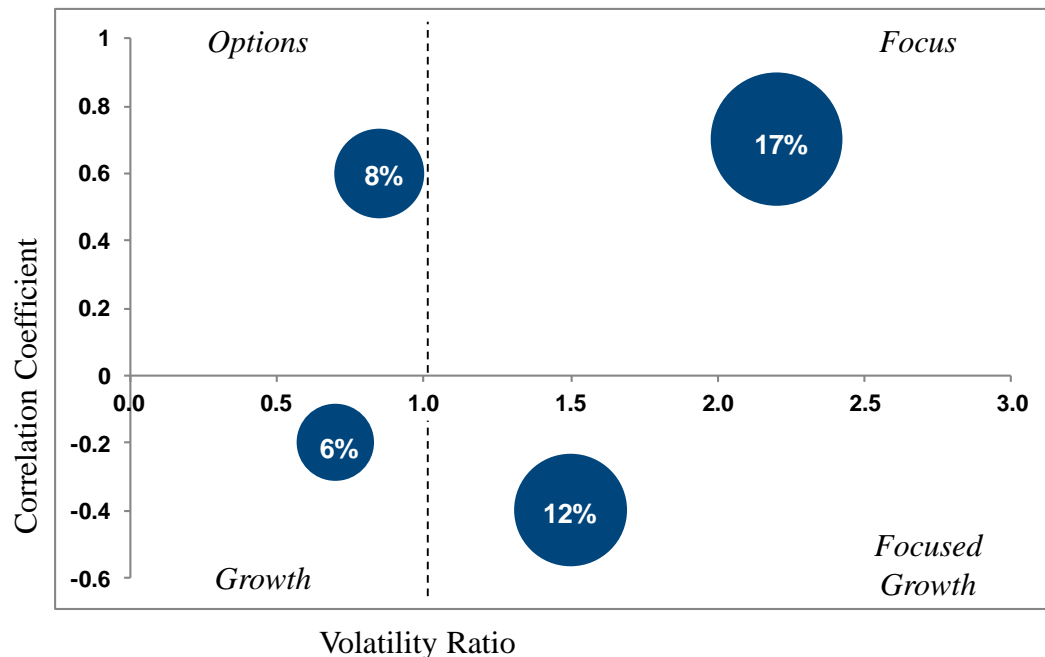


Figure 4: VCM Matrix Example

Note: bubble sizes reflect the mean operating margin of each business unit reflected in Table 2.

The business unit in the lower left-hand quadrant of Figure 4, titled *Growth*, represents the first business unit (BU-1) in Table 2. As can be seen, this business unit has a moderate mean operating margin (6%), low volatility ratio (0.7), and is negatively correlated (correlation coefficient of -0.2). This unit therefore seems to have attractive growth characteristics; meaning, diversification benefits and the seeming potential for margin expansion, which formal strategic and financial analyses would need to validate. For example, is the negative correlation the result of materially different product/service offerings or is it simply a function of potentially transient market dynamics such as life cycle effects? Similarly, is the relatively low volatility due to a newer product that has yet to achieve its market potential or a more mature product that is stagnating?

The upper left-hand quadrant in Figure 4 is titled *Options*, and represents the second business unit (BU-2) in Table 2. This unit's positive correlation (0.6) can be indicative of similar product/service offerings between the business unit and its holding company and thus its relatively low volatility ratio (0.9) may equate to a reasonably priced growth option *if* the potential for sustainable margin expansion exists. As volatility is a key option pricing variable certain lower volatility business units can be viewed as low cost options *if* future strategic initiatives and execution activities result in “sustainable” margin expansion, sustainability being a core corporate strategy concept since Bain (1956). If analysis supports exercising the option during the current strategic planning cycle, then capital can be allocated to pursue a strategy

expected to result in sustainable margin expansion; however, if analysis determines that the option is not yet ready to be exercised, then the holding company could retain and manage the option within its portfolio of options (i.e., the business units falling within this quadrant) until such time as disposition (i.e., exercise or liquidation) is decided upon.

The third business unit (BU-3) resides in the upper-right quadrant, titled *Focus*, and is relatively volatile (volatility ratio of 2.2), positively correlated (correlation coefficient of 0.7) and highly profitable (mean operating margin of 17%). Such units tend to be the subject of intense managerial attention because they can powerfully influence the overall performance of a holding company. Therefore, the intense managerial attention is certainly understandable but herein lays the competitive risk of "the innovators dilemma" propounded by Christensen (2000 [1997]); namely, focusing intensely on the performance of very successful business units to the detriment of emerging and potentially disruptive ones. The solution to this dilemma, according to Bower and Christenson (1995), is to manage potentially significant sources of competitive disruption "in an organizational context where small orders create energy, where fast low-cost forays into ill-defined markets are possible, and where overhead is low enough to permit profit even in emerging markets" (p. 53). This is exactly the context in which venture and/or immature business units, which were mentioned previously, should be managed; namely, taking every reasonable effort to make such units profitable as quickly as possible so they can be evaluated within the context of the broader business unit portfolio.

The final business unit (BU-4) in the exhibit, titled *Focused Growth*, is in the lower right-hand quadrant and is relatively volatile (volatility ratio of 1.5), negatively correlated (-0.4) and profitable (mean operating margin of 12%). Business units like this are generally transitory because they tend to either profitably grow thereby transitioning to the *Focus* quadrant or not grow and follow one of two paths: remain profitable and thus a valuable portfolio component or, in the case of eroding profitability, become candidates for divestment or closure if they cannot be turned around.

At this point it is important to note that the objective of portfolio analysis like this is *not* to derive definitive conclusions; indeed, overselling the conclusions of portfolio analysis from either a financial (Markowitz, 1952) or strategic (Henderson, 1979) perspective helps to explain the troubling results generated from portfolio analysis in the past. However, when used properly, portfolio analysis can effectively enable more rigorous or mathematically intensive forms of analyses that can be used to practically inform strategic planning, and the capital allocations resulting therefrom.

## Strategic Planning Overview

*Strategic planning* is the process of defining a firm's objectives and then allocating capital to economically achieve those objectives over time. According to Kaplan and Norton (2001), this process "should articulate the theory of the corporation, the rationale for having SBUs [strategic business units] operating within the corporate structure, rather than having each SBU operating as an independent entity, with its own governance structure and independent source of financing" (p. 169). From here, the next logical step in the process is to estimate business unit required rates of return or hurdle rates for use of the holding company's capital. Significantly, these hurdle rates often serve as the discount rates of cost-benefit, net present value (NPV) analysis that is typically

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included in many strategic plans. While NPV analysis is both popular and appropriate for some business units, it is not appropriate for others. For example, it is well known that NPV does not adequately capture the value of optionality (e.g., Amram and Kulatilaka, 1999). Additionally, businesses experiencing dynamic growth are difficult to value with NPV analysis. More advanced forms of analyses such as real options valuation, scenario analysis, simulation, etc., are frequently needed to model business units like these. In general, NPV is optimal when applied to stable, mature businesses because the costs and benefits of such businesses can be modeled with reasonable assumptions. Obviously, all of the various analyses that may be used must coherently come together in a strategic plan and its capital request.

One issue that sometimes complicates this process is unclear roles and responsibilities surrounding all of the analyses that may be performed; meaning, analyses conducted by corporate finance and business unit analysts. The emergence of analytical "centers of excellence" in many global firms has exacerbated confusion between the two such as when corporate financial analysts seek to "add value to the business" by undertaking business unit-specific analysis that traditionally has been the domain of business unit analysts. To help rectify such situations we have identified the following five core strategic planning steps and related roles and responsibilities:

1. At the holding company level, corporate finance should prepare summaries of business unit operating histories that compare actual to expected performance, along with estimates of appropriate required rates of return (or hurdle rates).
2. Also at the holding company level, corporate finance should gain an understanding of how the firm's portfolio of business units could be economically managed across a strategic planning cycle. As part of this effort, pointed strategic questions should be generated, the answers to which will inform the analyses that will be conducted by the business units in preparation for the planning cycle.
3. At the business unit level, analysts should work through the specifics of their strategic plans in detail, and estimate the amount of capital that is required to economically fund them. A significant portion of the work involved in this effort will be addressing key strategic questions, both the ones generated in step two above, as well others generated from the business units' analyses. One of the analytical tools that we have practically employed in this area is a business unit-specific mean-variance analysis such as that illustrated in Figure 2, which has proven strategically useful.
4. Also at the business unit level, analysts should practically quantify the expected outcomes of their strategy via a formal cost-benefit analysis.
5. Finally, business units should prepare a formal plan for holding company management's review that proposes a strategy to meet and hopefully exceed their assigned hurdle rate, and that identifies the amount of capital required to economically fund it.

While the above is a basic overview it has the benefit of clear roles and responsibilities for both corporate finance and business unit analysts with each function operating within its circle of competence: corporate finance estimates hurdle rates and provides guidance on how the portfolio of the holding company's business units could be economically managed while business units conduct the analyses needed to derive their strategies, and related funding requirements, to meet and hopefully exceed their assigned hurdles.

## Conclusion

Dialogue in strategic planning sessions can sometimes become heated, especially on the subject of business unit hurdle rates. For example, we have been involved in sessions where business unit executives have aggressively challenged their estimated hurdle rates. In one such instance, an executive of a high performing unit actually asked, "Why am I being punished with such a high hurdle rate? Given my unit's performance, our hurdle rate should be much lower!" One generally cannot reply to such questions by commenting on the basics of asset pricing theory, but that does not mean theory should be ignored.

The central premise of the CAPM (i.e., that a required rate of return is a function of a risk-free rate plus a premium for risk that cannot be diversified away) has a great deal of intuitive appeal. Therefore, when the model's logic is applied to a core strategic metric like operating margin the results can prove both practical and insightful. For example, in response to an executive who challenged his hurdle rate in a manner similar to that described above it was noted that: (1) a hurdle rate is simply a required rate of return *not* a reward or punishment, and that (2) the business unit in question's margin expansion was highly correlated to the holding company's and this was expected to continue, hence the "relatively high" hurdle rate. Therefore, (3) to the extent this executive wanted a lower hurdle rate he was advised to begin assessing diversification options. Thus, attention was directed away from the mathematical calculations of the hurdle rate and toward the strategic dynamics of the business unit, which is obviously the correct focus of strategic planning discussions, and something that is generally not possible with more quantitatively complex approaches (such as VaR).

Portfolio analysis can also serve as a source of contention because the implications of it are so high; namely, the allocation of a firm's capital. While a variety of formal frameworks and models are available to inform portfolio analysis, the complexity inherent in many of them often serves to complicate, rather than enable, strategic planning. But again, this does not mean that theoretical models should be ignored: by leveraging existing theory we were able to create a practical portfolio matrix from the same variables that were used in our business unit hurdle rate model (the volatility ratio and correlation coefficient) thereby linking the two analyses. Such a linkage helps to focus attention on key strategic considerations like profitability (operating margin), volatility (margin expansion or contraction), diversification (the correlation coefficient), and competitive dynamics, which are appropriate topics of strategic planning discussions in contrast to the idiosyncrasies of the analytical techniques that are used to inform the planning.

One area that has begun to generate some level of contention at many firms is a strategic planning analytical rivalry between corporate finance and business unit analysts. Each of these functions obviously can and should play a role in strategic planning, and therefore by clearly delineating roles and responsibilities for each a holding company can help to ensure both the process efficiency of its strategic planning efforts as well as the allocative efficiency of its capital.

In closing, the approaches described in this paper were designed and implemented to facilitate the kind of pointed questioning that has characterized many successful corporate finance functions over time. As Drucker (1954) insightfully observed, "The most common source of mistakes in management decisions is the emphasis on finding the right answer rather than the right question" (p. 351). Nowhere, perhaps, is this more applicable in early 21st century

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corporate finance than in the areas of business hurdle rates, portfolio analysis and strategic planning.

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# THE SOCIAL AND SUSTAINABLE FINANCE LANDSCAPE IN HONG KONG: AN EMPIRICAL STUDY ON FACTORS THAT AFFECT THE CHOICE OF FINANCING STRATEGY

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**Abstract:** *This Paper studies the characteristics and availability of social and sustainable financing in Hong Kong. There is growing interest in financing high impact initiatives with social and sustainable outcomes – through grants, venture philanthropic capital, impact and sustainable investments. Funds available for social and sustainable finance in Hong Kong are estimated at US\$19 billion.*

*The paper is divided into four sections:*

*First, we explore the size of social and sustainable finance in Hong Kong.*

*Secondly, we take a top-down approach to examine the views, expectations and approach of capital providers in social and sustainable finance.*

*Thirdly, we take a bottom-up approach through case studies on the different financing models deployed by prominent impact innovators. We conclude that the choice of financing model is linked to three main factors: (1) organisational culture; (2) business nature; and (3) network accessibility.*

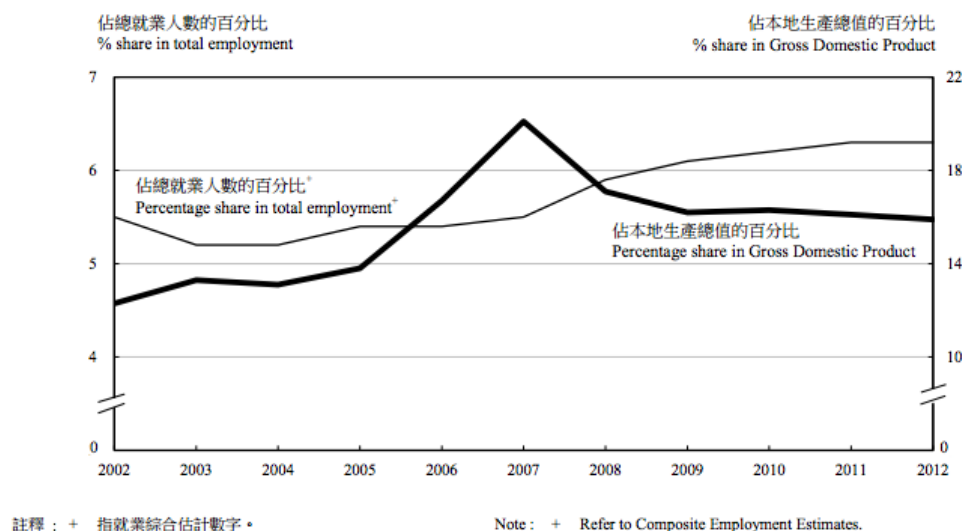
*Finally, we conclude with analysing the expectation mismatch “gap” between financiers and impact innovators, and how these gaps may be narrowed through engagement, layered capital and stewardship.*

**Keywords:** *Engagement, Layered Capital, Stewardship, Utility, Welfare, Return, Social Entrepreneurship, Venture Philanthropy, Impact Investment, Social Finance, Sustainable Finance*

## INTRODUCTION

Hong Kong is one of the most dynamic international financial centres in the world and a gateway to China’s substantial wealth. Latest figures show that the contribution of the financial services sector to Hong Kong’s Gross Domestic Product (GDP) stood at 16% and its contribution to total employment continues to increase (Figure 1).

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*Source: Census and Statistics Department, Hong Kong Government*

FIGURE 1

Percentage shares of the financial services sector in GDP (at basic prices) and total employment (2002-2012)

## MARKET SIZE

There is no official assessment of the amount of capital available for social and sustainable financing in Hong Kong. In principle, such capital tends to be issue oriented and with targeted outcomes that meet major community and environmental needs. As such, funding categories include government grants, charitable donations, philanthropic, impact and sustainable investment capital.

### Government Grants

Government funds available for social and sustainable finance total HK\$ 29.5 billion (US\$ 3.8 billion). They are available from a range of fund initiatives managed by different government departments:

### *Environment and Conservation Fund (ECF)*

Established in 1994, the HK\$ 5 billion (US\$645 million) ECF promotes education and research supportive of a sustainable environment and conservation. It provides seed money for green investment projects such as waste management, carbon audits and energy efficiency<sup>1</sup>. In the three years up to March 2013, HK\$1.1 billion (US\$141.9 million) of grants have funded over 2,000 projects with an average funding size of HK\$500K (US\$64.5K)<sup>2</sup>.

<sup>1</sup> <http://www.ecf.gov.hk/text/en/home/index.html>.

<sup>2</sup> Environment and Conservation Fund Trustee Reports: 2010-2011; 2011-2012 and 2012-2013.

### ***Community Investment and Inclusion Fund (CIIF)***

Established in 2001 with HK\$300 million (US\$38.7 million), CIIF builds social capital through networks, collaborative spirit and social cohesion within local communities<sup>3</sup>. By end 2013, CIIF had funded 268 projects, covering family and child welfare, youth development, elderly support and empowerment, community capacity building, social integration, healthcare and cross-generational integration (Figure 2).

Major Categories & target Groups	No. of Projects	Percentage % (by HK\$)
Family and Child Welfare	87	32.5%
Community Capacity Building	66	24.6%
Youth Development	50	18.7%
Social Integration	28	10.4%
Healthcare	25	9.3%
Cross-generational Integration	9	3.4%
Elderly Support and Empowerment	3	1.1%
TOTAL	268	100%

*Source: CIIF 2014*

FIGURE 2

CIIF-funded Projects 2001 – 2013

In January 2013, the Legislative Council approved an additional injection of HK\$200 million (US\$25.8 million) to CIIF to ensure that the Fund could continue to perform its social function in furthering social capital development.

### ***Enhancing Employment of People with Disabilities through Small Enterprise Fund (3Es)***

Established in 2001, the HK\$154 million (US\$19.8 million) 3Es Fund provides seed grants to non-profit making organisations (NPO) to set up social enterprises<sup>4</sup>. The grant ceiling is HK\$2 million per business and the maximum funding period is three years. The business is expected to become self-sustaining after the funding period.

<sup>3</sup> <http://www.ciif.gov.hk/en/home/>.

<sup>4</sup> <http://www.social-enterprises.gov.hk/en/support/funds.html>.

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## ***Sustainable Development Fund (SDF)***

Established in 2003, the HK\$100 million (US\$12.9 million) SDF supports initiatives that develop public awareness of sustainable development and encourage sustainable practices in Hong Kong<sup>5</sup>. Six projects were approved in 2013, with an aggregate funding amount of HK\$6.4 million (US\$825K). Including this round of applications, a cumulative total of 57 projects have been approved for grants from the Fund, involving a total amount of US\$55.7 million (US\$7.2 million)<sup>6</sup>.

## ***Enhancing Self-reliance through District Partnership Fund (ESR)***

Established in 2006, the HK\$300 million (US\$38.7 million) ESR Fund promotes sustainable poverty prevention and alleviation efforts at the district level that help enhance self-reliance, targeting socially disadvantaged groups. It provides seed grants for setting up social enterprises<sup>7</sup>. Formerly available to charitable organisations only, the Programme now accepts applications from NPOs as a trial (SIEDF 2013: Annex 4).

## ***Partnership Fund for the Disadvantaged (PFD)***

Established in 2010, the HK\$400 million (US\$51.6 million) PFD Fund promotes partnership amongst the welfare sector, business community and the Government to support the disadvantaged<sup>8</sup>. The Government provides matching grants to donations made by businesses to support NGOs in running social welfare projects. Priorities are given to applications that can enhance quality of life, employment and skills, empowerment and exclusion prevention. Projects tend to be related to elderly care, family and child welfare, rehabilitation and medical social services, youth and correctional services and inclusion initiatives of disadvantaged groups, such as low income classes, the unemployed, ethnic minorities and new immigrants / arrivals.

## ***Social Welfare Development Fund (SWD)***

Established in 2010, the HK\$1 billion (US\$129 million) SWD funds capacity building training and business systems upgrades for non-government organisations (NGOs)<sup>9</sup>.

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<sup>5</sup> <http://www.susdev.gov.hk/html/en/sdf/>.

<sup>6</sup> Press release by the Hong Kong government, “Six projects approved for funding under Sustainable Development Fund” 26 August 2013. Available at: <http://www.info.gov.hk/gia/general/201308/26/P201308260231.htm>.

<sup>7</sup> [http://www.had.gov.hk/en/public\\_services/en\\_self\\_reli/](http://www.had.gov.hk/en/public_services/en_self_reli/)

<sup>8</sup> [http://www.swd.gov.hk/en/index/site\\_pubsvc/page\\_supportser/sub\\_partnership/](http://www.swd.gov.hk/en/index/site_pubsvc/page_supportser/sub_partnership/).

<sup>9</sup> NGOs are defined as organisations that have applied for and attained section 88 status in Hong Kong. It is not equivalent to voluntary or non-profit making organisations. See [http://www.ird.gov.hk/eng/tax/ach\\_tgc.htm](http://www.ird.gov.hk/eng/tax/ach_tgc.htm).

### ***Community Care fund (CCF)***

Established in 2011, the HK\$ 21.5 billion (US\$2.8 billion) CCF provides assistance to people facing economic difficulties, in particular those who fall outside the social safety net or those within the safety net but who have special circumstances that are not covered<sup>10</sup>. As of May 2014, HK\$4.1 billion (US\$529 million) has been deployed to support 25 programmes and their intermediaries.

### ***Social Innovation and Entrepreneurship Fund (SIEF)***

Established in 2012, the HK\$500 million (US\$64.5 million) SIEF supports social innovation initiatives that create social impact and build social capital for poverty relief and prevention in Hong Kong<sup>11</sup>. The first batch of fund applications, aimed at taking up one-fifth of the total fund amount, is to focus on ecosystem building. Intermediaries are invited to develop and run programmes on capacity building and innovation (Chow 2014).

### **Philanthropic Funding**

Some family offices have separate asset allocation and financing strategies for social ventures with earned income. According to a survey conducted by UBS, a private bank, and INSEAD, a French business school, 36% of respondents ranked social entrepreneurship as the most important trend in philanthropy. 17% of respondents ranked value-based investing (investment in line with personal and family values such as sustainability, inclusive education and giving back to society) as most important (Badham 2014: 28; Mahmood and Santos 2011: 21, 52).

Determining the exact amount of philanthropic funding in Hong Kong would need in-depth study, but this paper makes an estimate based on figures available from the World Bank and the finance industry. Hong Kong and the US philanthropic industry are compared due to<sup>12</sup>:

- (i) Comparable average literacy rates of over 95%;
- (ii) Hong Kong has lower birth rates with less need to save for the next generation (1.2 child per couple versus 1.9 in the US); but
- (iii) Higher life expectancy hence a greater need to plan for the future post-retirement (83.5 years versus 78.7 years in the US);  
and where
- (iv) Hong Kong's total Gross Domestic Product (GDP) is 1.68% of US GDP; and
- (v) Hong Kong's GDP per capita stands at 71.7% of the US in 2013.

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<sup>10</sup> <http://www.communitycarefund.hk/en/finance.asp>.

<sup>11</sup> SIE Fund March Briefing Session on Application for Intermediaries March 2014.

<sup>12</sup> World Bank data 2012-2013. <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>

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US foundations have US\$662 billion in assets under management (AUM) and US\$49 billion is available as philanthropic funding<sup>13</sup>. Taking into account GDP adjustment and tax discount factors<sup>14</sup>; we estimate that there is US\$484 million of philanthropic funding available in Hong Kong.

Disaster relief is an alternative way of estimating the amount of philanthropic funding readily available. After the 2008 Sichuan earthquake<sup>15</sup>, US\$128 million was raised from private sources in Hong Kong, including individuals, corporate donations and charities. The money was used to rebuild local homes and infrastructure. Philanthropic funds from Hong Kong represent 14.6% of the total US\$879 million disaster relief funds received as reported by the local authorities in China. As this was for a single incident, an aggregate amount of US\$484 million appears to be a reasonable estimate.

The challenge to “philanthropy”, or financing for “public welfare” (公益) - the term more commonly used by Chinese - is to create opportunities that help shift spontaneous funding to strategic financing in order to address the roots of societal and environmental issues. In the case of natural disasters for example, funds could be channeled to earthquake resistant infrastructure, alternative energy supply sources and disaster prevention programmes.

### Impact investment

A number of institutions<sup>16</sup> have tried to estimate the global and regional size of the impact investment market, believing that the global impact investment market could grow to US\$500 billion by 2018 (Freireich and Fulton 2009).

A survey conducted by J.P. Morgan and the Global Impact Investor Network (GIIN) estimated that US\$12.7 billion is currently available for impact investment (Saltuk et al 2014). Using a similar method to that for estimating philanthropic capital, we account for:

- (i) Asia’s contribution to global growth as impact investment seeks high growth and sustainable financing opportunities<sup>17</sup>;
- (ii) Hong Kong’s position as a private financing hub in Asia; whilst
- (iii) Given its emerging trend as an investment style or asset class, AUM in impact investment may overlap with philanthropic funding (section

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13 <http://foundationcenter.org/gainknowledge/research/keyfacts2013/foundation-focus.html>.

14 In the US, salaries and corporate income tax rate stands at around 35%. In Hong Kong, salaries and corporate income tax rate stands at around 17%. The estimation formula assumes a linear relationship amongst the relevant factors encountered: Philanthropic capital in the US (US\$49 billion) x GDP adjustment (1.68%) x GDP per capital adjustment (71.7%) x tax discount (82.0%).

15 “More earthquake donations urged”, News on the *Hong Kong government* website 28 May 2008. <http://archive.news.gov.hk/en/category/healthandcommunity/080519/html/080519en05009.htm>.

16 These institutions are Monitor Institute, Avantage Ventures and JP Morgan, amongst others.

17 World Bank (2014) *East Asia Pacific Economic Update* April 2014: 4. <http://www.worldbank.org/content/dam/Worldbank/document/EAP/region/eap-update-april-2014-full-report.pdf>.

- 1.1.2) or sustainable investment (section 1.1.4) hence we have introduced an adjustment factor of 30%; but
- (iv) There is no tax discount factor in this calculation as it is unclear if most impact investment opportunities worldwide are subject to tax incentives.

Based on the above assumptions, the estimated amount of impact investment capital available in Hong Kong<sup>18</sup> is US\$864 million.

### Sustainable Financing

Targeted sustainable financing often takes a theme-based approach<sup>19</sup>, investing in infrastructure-related sectors such as environmental technology, waste management, social housing and green building<sup>20</sup>. The private markets are most active in promoting this type of financing strategy (Chow 2014). For Asian markets outside Japan, sustainable investment AUM totalled US\$ 64 billion (GSIA 2013). Fifty-two private equity managers based in Greater China currently invest, or plan to invest, in environmental technology, committing allocations of over US\$19.4 billion. Given Hong Kong's role as a major fund raising centre for China and Asia, and based on figures from the private equity industry<sup>21</sup>, it is reasonable to estimate that sustainable investment capital totals US\$13.8 billion in Hong Kong.

To summarise, the total estimated amount of capital available for social and sustainable financing is US\$19 billion (Figure 3).

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18 The estimation formula assumes a linear relationship amongst the relevant factors encountered: Global impact investing capital (US\$12.7 billion) x Asia growth adjustment (45%) x HK private financing hub in Asia proxy of 21.6% as referenced in Chow [2014: 13]) x 0.70 (overlap adjustment factor).

19 Not including investment that integrates environmental, social and governance (ESG) factors.

20 Handy, R. (2014) CalPERS and Asian investors back global infrastructure funds *Investors & Pensions Europe* 5 August 2014. CalPERS has committed US\$485 million to a global infrastructure partnership with UBS; A range of Asian institutional investors have committed US\$3.2 billion to Aberdeen Global Infrastructure Partners Fund.

21 *Ibid.* Hong Kong as a private financing hub in Asia accounts for 21.6% funds raised in Asia (Chow 2014: 13).

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Source of Funds	Amount (US\$ million)	Percentage (%)	Estimated or Actual
Government grants	3,800	20.0%	Actual
Philanthropic capital	484	2.6%	Estimated
Impact investment	864	4.6%	Estimated
Sustainable investment	13,824	72.9%	Estimated
TOTAL	18,972	100.0%	

FIGURE 3

Social and Sustainable Financing Capital in Hong Kong

### *DEFINITIONS: RECONCILE DIFFERENCES THROUGH AN ECONOMISTS'S LENS?*

There is no official definition of social and/or sustainable finance. Some believe that they are different approaches *to mobilising private capital that delivers social and environmental impact with, or without, financial return*. They create opportunities for investors to finance projects that benefit society and for community organisations to access new sources of funds. For others, they are hybrid investment styles connected to funding charitable and philanthropic causes where innovation is the prime objective. Financial return is considered a means to ensure operational sustainability rather than an end goal in itself. Social and sustainable finance are also deployed in conjunction with activities related to corporate social responsibility, responsible investment, impact investment, blended value and microfinance.

Through interviews conducted in Hong Kong (see APPENDIX for a full list of contributors to this Paper), social finance is commonly understood to be goal-specific and people-oriented, addressing a particular social issue. Sustainable finance is for the environment and longer-term initiatives related to managing externalities, resources and creating clean energy<sup>22</sup>. Despite these differences, both financing strategies aim to address market failures and their consequences, such as income inequality and climate change.

Depending on the core organisation activities of the interviewees, social finance could mean being part of sustainable finance, and vice versa. This reinforces the fact that capital providers active in the area of social and sustainable finance are a heterogeneous group with diverse understanding of the terms. They are likely to have a wide spectrum of risk and return expectations for their financing initiatives and investment holdings, covering various combinations of financial, social and environmental outcomes (Mair and Milligan 2012). At present, the sources of social finance are government and private wealth; whilst sustainable finance has already

<sup>22</sup> "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." World Commission on Environment and Development's (the Brundtland Commission) report *Our Common Future* (Oxford: Oxford University Press, 1987). This is also quoted on the Hong Kong government website: <http://www.gov.hk/en/residents/environment/sustainable/dev.htm>.

entered the mainstream capital markets with support from major institutional asset owners and investors<sup>23</sup>. The market sizing exercise detailed in Section 1 of this paper reinforces this conclusion.

Note that “return” should be understood in a wider context from the *value* angle beyond financial return in this Paper. Using appropriate terms that have long been advocated by prominent economists, such as the late Gary Becker, and Adam Smith, the founding father of modern economics, individuals that seek to maximise “return” should be interpreted as those who want to maximise their “welfare” or “utility”, taking into account intangible return such as the thrill of deviancy and the pleasure of altruism<sup>24</sup>, as they deliver *personal value* important to the capital providers – otherwise, those financing activities would not have taken place. It also explains the rationale behind social science research strategies used to calculate social return on investment (SROI)<sup>25</sup>, such as choice modeling or revealed preferences, where interviews with stakeholders are of vital importance in estimating the translated economic benefits delivered by the business or projects being measured.

To explore the idea of how stakeholders perceive *value*, *utility* and *welfare* of social and sustainable finance initiatives, the following chapters 2 and 3 summarise the views of contributors of this Paper, divided into three core groups:

- **Asset owners** – family offices, high net worth individuals and institutional funds;
- **Impact innovators** – social enterprises, venture philanthropic initiatives;
- **Intermediaries** – facilitators of social and sustainable financing capital and service providers of impact innovators and sustainable investments.

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<sup>23</sup> Sullivan, K. (2013) Sustainable and Responsible Investing goes Mainstream *Bloomberg* 18 May 2013.

<sup>24</sup> Remembering Gary Becker *The Economist* 12 May 2014.

<sup>25</sup> SROI is an adjusted cost-benefit analysis combines, in the form of estimated cash flow, the ratio of discounted costs and benefits over a certain period of time. The series of cash flow can be converted to net present value (NPV) by using a discount rate. The recommended SROI discount rate is 3.5%, which is acceptable for a project-related investment that seeks grant funding where interest rate is essentially zero, but unrealistic for social enterprises that operate in Hong Kong and China. From experience, appropriate discount rate used in Hong Kong and China lies between 5-11%.

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### TOP DOWN VIEW

Asset owners and professional investors consider any financing decisions in relation to their total asset portfolio. Contrary to the investee's perception that capital providers make funding decisions on a case-by-case basis, those who are disciplined and with growth potential usually follow basic principles and procedures, as follows: (1) Establish an investment philosophy; (2) Set investment objectives for asset allocation; and (3) Determine levels of engagement integrated with monitoring. It is only when asset allocation decisions have been made, and risk and return profiles of each asset class have been set, that bottom up screening for suitable financing projects and investment product selection takes place.

#### INVESTMENT PHILOSOPHY

Organisations have different investment philosophies aligned with their purposes and goals. For family offices, the investment philosophy strongly reflects family values; this often perpetuates through the entire investment decision-making and post-investment evaluation process.

For example, the **RS Group** aims to create a paradigm shift in societal values and priorities so that economic growth does not jeopardise human development and environmental sustainability<sup>26</sup>. Its investment philosophy and activities are therefore aligned with this aim.

The Group is a strong supporter of investment research on the topic of social entrepreneurship and impact investment, sponsoring reports such as *Money for Good: Global Trends and Local Potentials in Engaged Giving and Social Investing* by Social Ventures Hong Kong and *Mind the Gap: Lessons and Findings* by EngageHK.

The Group's portfolio is diversified across asset classes. Directly invested projects currently comprise 3-5% of total assets due to these projects requiring abundant resources for management, support and monitoring. The Group adopts a *total portfolio approach*, under which all of its activities, from strategic philanthropy to capital management, support its mission of contributing to sustainable development. RS Group's approach is in line with impact pioneers from the United States such as KL Felicitas Foundation. The Foundation has taken up to seven years to convert their family investments into a portfolio that is 93% impact driven, with out-of-market and liquidity risks prudently managed throughout the transition period<sup>27</sup>.

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<sup>26</sup> Ms. Annie Chen founded the RS Group. For further details, see <http://www.rsgroup.asia>.

<sup>27</sup> Chow, C. (2014) Fireside Chat with Impact Giants *Homage Consulting Blog* 21 March 2014. <http://homageconsulting.com/2014/03/21/a-fireside-chat-with-impact-giants/>.

### INVESTMENT OBJECTIVE

A *total portfolio* approach is not the only approach to social and sustainable finance. Some high net worth individuals (HNWs) and families take a *core-satellite* approach where the core asset allocation goes into low risk and passive investments to meet the objectives of cash flow generation and wealth preservation. The satellite allocation goes into high risk high return themed products and projects, including private equity, venture capital, other alternative investment funds, start ups, social enterprises and venture philanthropic initiatives.

**Legacy Advisors** is one of the earliest family offices in Hong Kong, established in 1995. It is a pioneering local organisation that invests in socially minded start-ups<sup>28</sup>. Amongst the many high impact businesses that the family has invested in are *Adlens*, a company that develops and sells variable focus eyewear - founded on a strong mission to make affordable eyewear available in developing markets where access to opticians is minimal<sup>29</sup>; and a cardio vascular hospital in Shanghai, China, designed to nurture a new generation of medical professionals with improved ethics. The family invested a significant amount of capital in research and development of the eyewear company, with an engagement period close to ten years, delivering multiple generations of the product (Figure 4).



FIGURE 4  
The Multiple Generations and Variations of Variable Focus Eyewear

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<sup>28</sup> Mr. James Chen is a third generation member and Chairman of a family owned enterprise, Wahum Group Holdings, a Hong Kong and Nigeria-based manufacturing company. In 1995, he founded and became CEO of Legacy Advisors Limited, a single family office. In 2003, James set up the philanthropic arm of the family office – Chen Yet-Sen Family Foundation. The Foundation has supported more than 170 initiatives in Mainland China, Hong Kong and West Africa.

<sup>29</sup> Vision for a Nation, a registered charity founded by James Chen, aims to provide access to eye care and affordable glasses worldwide. Currently, the organisation is focusing on Rwanda.

## THE SOCIAL AND SUSTAINABLE FINANCE LANDSCAPE IN HONG KONG: AN EMPIRICAL STUDY ON FACTORS THAT AFFECT THE CHOICE OF FINANCING STRATEGY

For the hospital project, patient capital was again instrumental in overcoming teething problems, and securing operating licenses that were difficult to get approval for. Over the years, the family and its early stage HNW co-seeders managed to bring in international institutional investors, such as Fidelity and GIC, the sovereign wealth fund of the Singapore government, in the later funding rounds for the hospital complex construction. The success of both projects would not have been possible without engaged efforts and risk-taking capital from the early funders.

The investment objectives of both of the above projects were clearly impact and solution oriented rather than financially driven. Stewardship played a key role in project success, unlike in the core part of the family portfolio where the family takes a back seat in driving the investment. Prudently managed wealth in the core portfolio provides *Legacy Advisors* with a strong foundation to take calculated risks that generate high impact.

### DEGREE OF ENGAGEMENT

Different investment approaches, whether *total portfolio*, *core-satellite* or otherwise, allow asset owners to meet their own wealth diversification and personal development objectives. They are a combination of strategies involving capital preservation and growth, cash flow management, knowledge building and community engagement, reflecting the importance of understanding “return” from the perspective of one’s aim to maximise “value”, “welfare” and “utility”.

Private asset owners mostly agree that there is a need for a *layered capital* solution for financing<sup>30</sup> – where funding of different risk and return appetites can be appropriately structured to support social innovation: from idea generation; to prototype; to start up establishment; and to scaled up operation, as in the case of the Shanghai hospital project. Generally, intentional and catalytic capital that is risk taking and innovative by nature should be filled by grants and philanthropic capital that can afford total loss in the worst-case scenario. When a prototype product is available with demand from identified customer groups, angel and patient investment capital can be brought in. When business scales, commercial capital from institutional and mainstream investors can play a bigger role.

Shifting the discussion focus from HNWs and families to institutional investors, we note that their objectives are different – the managers (agents) of the funds have clear mandates to act in the best interests of their asset owners (principals). Trustees of pension funds have fiduciary duties to act in the best interests of pension fund members. Sovereign wealth funds, such as funds managed by the Hong Kong Exchange Fund (HKEF), Abu Dhabi Investment Authority (ADIA) and Malaysia’s Khazanah are mandated to invest in future generations and a sustainable future for the sovereign’s people<sup>31</sup>. With rapidly increasing opportunities in infrastructure,

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30 Layered capital solution here refers to bringing capital of different nature, and risk and return profile in a multi-sector collaborative approach to help social and sustainable businesses to grow. This is a different concept from multi-layered capital solutions (Mugaloglu 2012) that segments the capital markets into informal and formal segments with multi-levels of requirements on audit and tax incentives.

31 The investment portfolio of the HKEF set up in 1992 is mandated to preserve the fund's value for future generations in Hong Kong. In 1981, ADIA received an official mandate from its ruler Mohammed bin Zayed Al Nahyan to invest for future generations. In the 2013 Corporate Social Report of Khazanah, Malaysia’s Sovereign Wealth Fund, set up in 1993, it reiterated its strategic

renewable energy and waste management in Asia, the allocation to sustainable sectors is set to grow.

**APG**, a Dutch pension fund manager that invests globally with significant investments in Asia, established its responsible investment policy based on a *total portfolio* approach in 2006. The policy advocates the achievement of returns in a responsible manner through a focus on environment, social policy and good governance. The manager invests into high social impact and sustainable sectors such as infrastructure solutions for climate change<sup>32</sup>, water shortage and pollution, microfinance, affordable housing<sup>33</sup> and green real estate. Other institutional investors such as CPPIB (CPPIB 2013), a Canadian pension fund; CalPERS (CalPERS 2012), a US pension fund; and the Norwegian Government Pension Fund (Dimson et al 2013) have also identified the above as high sustainability sectors where they actively seek equity investment and debt financing opportunities.

In 2013, APG started investing in green bonds. These are bonds issued by institutions that have made sustainable investing their core business, or companies that may label part of their activities as sustainable. Figure 5 shows the asset allocation of their high sustainability investment, amounting to Euro15.5 billion (US\$20.7 billion) and 4.5% of the total invested capital of the manager.

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approach to support and empower communities, encourage social inclusivity and improve local environments. Khazanah has invested US\$500m in sustainable development, or 0.1% of the organisation's AUM. The small allocation is due to limited opportunities in Asia at this point. See Marsh, J. (2013) Kazanah, EAPF discuss sustainable investing *AsianInvestor* 19 June 2013.

32 Preesman, L. (2013) APG to focus ESG policy on water management, climate change *Investments & Pension Europe* 3 September 2013.

33 Lowe, R. (2013) APG, LaSalle to finance residential, student housing *Investments & Pension Europe* 20 May 2013.

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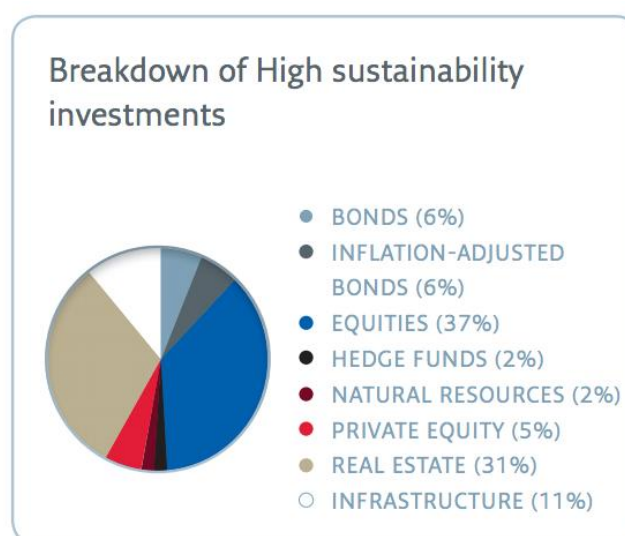


FIGURE 5  
APG High Sustainability Investments in 2013

APG seeks to shape sector development of its investments by actively participating in policy dialogue and by being an engaged shareholder. 45% of APG's votes are in Asian companies, including China, Japan and Australia (APG 2013). Policy, as soft infrastructure of a society, is most important in determining a sustainable future and inclusive community. Stewardship by institutional investors therefore creates a long-term impact on the functioning of the society and the environment.

## BOTTOM UP VIEW

### *TYPES OF FINANCING*

#### Grant Financing

Grant financing refers to philanthropic capital supporting a cause that does not necessarily require financial return as a result of the financing activity. *Friends International*, a French NGO that operates training restaurants for marginalised urban youths in South East Asia, adopts this financing model. Revenue from each restaurant is sufficient to cover the operating costs, but for each new location opening, a lump sum grant is sought from individuals and corporate foundations.

### EXAMPLE 1

#### Senior Citizen Home Safety Association (SCHSA)

<b>Website:</b>	<a href="https://www.schsa.org.hk/en/home/index.html">https://www.schsa.org.hk/en/home/index.html</a>
<b>Status:</b>	Non-profit organisation
<b>Mission:</b>	To enhance the living quality of the elderly through technology and people-oriented services
<b>Seed capital:</b>	HK\$2million (US\$268K) grant from Allied Group Ltd & HNWs
<b>Awards:</b>	Asia Pacific NGO Award (2005) Regional Social Enterprise Award – East & South-east Asia by Schwab Foundation (2009).

Established in 1996 after a prolonged cold spell during which more than 100 elderly living alone were found dead at home. The seed donation covered six months of operations and the building of a 24-hour manned call centre that supports personal care and emergency assistance services. Services have now been expanded to mobile assistance, home care and eHealth services.

The first five years of operations were challenging, but the business subsequently entered a high growth and profitable period with net profit margin in the range of 13-15% in its best times. In 2013, the organisation secured HK\$69 million (US\$ 8.9 million) in grants from the Hong Kong Jockey Club to renovate their headquarters, with a new Life Journey Centre - an interactive museum that enables the public to experience aging. The exhibits are divided into four zones, namely: 'Are you ready for the Journey', 'The Many Choices in Life', 'One-way tunnel' and 'Rest In Peace'. After the 'journey', participants are engaged in a group discussion and counselling session to rethink their lifestyle, so as to promote the messages of treasuring one's life and respecting the elderly. There is also a new Life Book writing service for seniors who wish to share their life stories. Over 400 customers have used this service in the past year.

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### Stakeholder Financing

Equity investors are incubators and business partners of the organisation. This is an alternative to grant financing when high capital investment is required, and when the business involves a close group of industry players who have an in-depth understanding of the challenges of the operating environment<sup>34</sup>.

#### EXAMPLE 2 Diamond Cab (DC)

<b>Website:</b>	<a href="http://www.diamondcab.com.hk/en/">http://www.diamondcab.com.hk/en/</a>
<b>Status:</b>	Limited Company
<b>Mission:</b>	Create a culture of barrier-free transportation for the disadvantaged
<b>Seed capital:</b>	HK\$2 million (US\$268K) equity capital - 51% from Social Ventures Hong Kong (SvHK); 20% from elderly homes & taxi operators; remaining from individuals
<b>Awards:</b>	Social Enterprise Awards UK finalist (2012)

Established in 2011 after three years of incubation at SvHK, a venture philanthropic organisation. The majority of the seed capital was used to purchase wheelchair-accessible cabs from Japan at a cost of HK\$400,000 (US\$51.6K) each, twice the price of ordinary cabs. Fuel, insurance and maintenance are also more expensive. For set up operations, DC obtained a HK\$1 million (US\$129K) loan from a commercial bank using the purchased cabs as collateral. The company services have high demand during prime hours of the day, but demand in the evening leaves the cabs under-utilised as an asset.

DC has expanded its revenue sources into advertising and events; there are plans to franchise its inclusive transportation model overseas and to serve the tourist industry under the brand *Diamond Leisure*. To scale up the business, DC needs a larger fleet and more cab licenses to operate. Until 2013, DC rented all of its licenses. The price of a license was HK\$7 million (US\$900K) in 2013, an increase of over 50% from 2009. In 2014, DC plans to establish a trust vehicle to facilitate co-investment. The trust will acquire a licence and a cab and rent them to DC. Investors can expect to receive income during the trust operating period and benefit from the resale value of the licence when the trust terminates (taking into account depreciation of the cab).

<b>KPIs:</b>	Number of wheelchair trips completed; percentage of return customers
<b>Comments:</b>	Stakeholder support, through seed capital injection and business partnerships, are crucial to the company's sustainability and continuous expansion. Further studies on this case may cover the investor profiles of the Trust fund.

Bubble Market *Bloomberg* 6 August 2013. Derived the prices of cab licenses from the data in this article and from conversation with staff from SvHK and Diamond Cab, as noted in Example 2.

## Crowd Financing

### EXAMPLE 3

#### Hong Kong Recycles (HKR)

<b>Website:</b>	<a href="http://www.hkrecycles.com/">http://www.hkrecycles.com/</a>
<b>Status:</b>	Limited Company
<b>Mission:</b>	Provide a convenient, genuine & low cost solution to recycling
<b>Seed capital:</b>	Founders capital of less than HK\$50K (US\$6,450)
<b>Awards:</b>	Funding enterprise of HKUST Social Entrepreneurship & Venture Philanthropy Course 2014

Established in 2012 by two environmentally conscious local citizens, HKR services households in the central business districts (CBDs) in Hong Kong. By 2013, it had 250 paid subscribers, provides employment to marginalised individuals, but experiences challenges in scaling up operations. SOW Asia Foundation, a venture philanthropic organisation, purchased a majority share of the Company and worked with the founders to expand the business.

In May 2014, HKR launched a campaign on Indiegogo, a crowd-funding website, and raised US\$16K for a new van. The backers' "perks" range from t-shirts and recycle packs to eco-tours to understand how waste is recycled.

**KPIs:** Students of the HKUST course used a simplified version of the social return on investment (SROI) approach and calculated that HKR generates 5X SROI. Other measures are: reduction in carbon footprint; number of clients served; employment of disadvantaged staff; relief of landfill.

**Comments:** Many crowd-funding backers are local citizens who share the same

Organisations engage funders with a common goal on issues that have impact on the community. The nature of financing can be debt, equity or product-specific.

Besides targeted fund raising for a product launch, a service upgrade or an asset purchase, crowd funding can also be used as a stakeholder engagement tool and for customer profiling. *One Earth Designs* (OED) is a clean technology company with origins in the non-profit sector and a hybrid corporate structure. Numerous international awards provided seed capital for research and development of a high efficiency and durable solar cooker designed for nomads in western China<sup>35</sup>.

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35 Chow, C. (2013) Will Social Impact Investing be the New Venture Capital? Inspiration from the "One Country, Two Systems" Model *Homage Consulting Blog* 17 February 2013. The author of this paper has also written a full case study with Professor Paul Forster of Hong Kong University of Science and Technology (HKUST) on OED, titled "*One Earth Designs: A "One Company, Two Systems" Model for Social Enterprise*". Available via the HKUST Business School Case Studies Centre.

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## EXAMPLE 4 ONE EARTH DESIGNS (OED)

<b>Website:</b>	<a href="http://www.oneearthdesigns.com/">http://www.oneearthdesigns.com/</a>
<b>Status:</b>	Hybrid for-profit/non-profit Group with entities in the US, Hong Kong and China
<b>Mission:</b>	Make clean energy accessible, convenient and shareable
<b>Seed capital:</b>	US\$1 million competition prize money (see “Awards”)
<b>Awards:</b>	CleanEquity Monaco (2014) The 41st International Exhibition of Inventions of Geneva, Winner of the Prize of the Public (2013) Dutch Postcode Lottery Green Challenge Winner (2010) MIT \$100K Emerging Markets Track Winner (2010) UNEP SEED Awards Winner (2010) United States Environmental Protection Agency P3 Awards Winner (2010) MIT IDEAS Awards Winner (2009) The St. Andrews Prize for the Environment Winner (2009) Muhammad Yunus Innovation Challenge Winner (2008)

Established in 2009 as a US 501(c)(3) non-profit foundation. The Company issued a convertible loan of US\$1.2 million to fund its operations. In 2012, it decided to expand beyond the Bottom of the Pyramid (BoP) markets into developed markets, starting from the United States.

In June 2013, it launched a campaign on Kickstarter, a crowd-funding website, reached its target of US\$42K within a month and went on to raise US\$143K in total by August 2013. Among the 507 backers, 373 or 73.6% ordered a solar cooker, *SolSource*, their flagship product. The backers were homesteaders, backyard grillers, green campers, urbanites, disaster preppers, and humanitarians interested in the cause of supporting global nomads. Customers came from eighteen countries in developed and emerging markets. Using the above information, OED refined its entry strategy into the US and developed complementary products, such as grill plates and cooker covers to strengthen the brand. It created an online community of users (<http://www.oneearthdesigns.com/community/>) to provide feedback and testing of products in different climate conditions; to engage with other clean energy innovators; and to formulate business development strategies for other markets.

<b>KPIs:</b>	First Certified B Corp in China. SROI calculated by a Harvard University based research team.
<b>Comments:</b>	The Company engages with its customers via Facebook and other online platforms to gain an in depth understanding of their behaviour, cooking habits and consumption patterns. Social and sustainable financing also act as a means of customer engagement.

## Private Placement

Private placement usually involves single deal fund raising where the investment offer is privately circulated on a confidential basis, similar to an angel investment deal.

### **EXAMPLE 5** **Dialogue in the Dark (DiD)**

**Website:** <http://www.dialogue-in-the-dark.hk/web/?lang=en>  
**Status:** Limited Company  
**Mission:** Engage and empower people of difference to create social impact  
**Seed capital:** HK\$3 million (US\$387K) equity from 20 HNWs

Established in 2008, DiD is a social enterprise that originated in Germany in 1988. Mr. Patrick Cheung, a serial entrepreneur and impact investor brought the social franchise to Hong Kong through establishment of an awareness-raising exhibition. DiD was named Hong Kong's most popular tourist attraction by the Hong Kong Tourism Board and ranked top 3 attraction in Hong Kong on TripAdvisor in 2013. Services have expanded to cover corporate training and events in the Dark, such as birthday parties, dinners and concerts.

In 2013/2014, the turnover of the Company reached HK\$22 million (US\$2.8 million), employing 41 full time staff and 60 part time staff. The Company has also paid a 5% dividend twice in three years of its operations, making it one of the most financially self-sustainable social enterprises in Hong Kong.

**KPIs:** Employment for the visually and hearing impaired. Number of visitors at the DiD exhibition centre.  
**Comments:** DiD HK has proven that when well-executed, a social franchise model could work very well. As the major shareholder and founder was a successful serial entrepreneur, his personal investment and involvement in the venture has provided additional confidence to other investors. This is very similar to an angel investment deal where the promoter of the investment is also an anchor investor and a determinant factor of funding success.

External private capital may not be brought in at the establishment stage of the business as in the case of DiD Hong Kong. Many small businesses began with informal loans and grants from friends and family (F&F), at times referred to as fools & family (F'&F) depending on one's experiences!

## THE SOCIAL AND SUSTAINABLE FINANCE LANDSCAPE IN HONG KONG: AN EMPIRICAL STUDY ON FACTORS THAT AFFECT THE CHOICE OF FINANCING STRATEGY

### EXAMPLE 6 Shangrila Farms (SF)

**Website:** <http://www.shangrilafarms.com/en/>  
**Status:** Limited Company  
**Mission:** Create a leading Chinese urban lifestyle brand for natural products that benefit rural communities and the environment  
**Seed capital:** HK\$1.5 million (US\$194K) equity from Malik family and friends

Established in 2009, SF rapidly expanded its business through innovative marketing strategies, quality products, urban beekeeping workshops and extensive networks. The business was already making a profit in the first two years. Similar to other high growth enterprises, scaling up requires SF to go beyond family and friends capital.

Since 2012, Ms. Sahra Malik, the CEO of SF, has been planning to source external capital to scale the business. In her plan, she hoped to raise US\$1.2 million in Series A tranche 1, and ultimately to reach US\$5 million after three tranches. Although funds raised to date have fallen short of target, she has managed to secure capital and incubation support from international impact investors such as Calvert Investment, through its Special Equities Programme, and LGT Venture Philanthropy, through its Accelerator Programme. In 2013, SF held its first “brand ambassador” fund raising event in Hong Kong, and subsequently held similar events in Beijing and Shanghai. Ms. Zhou Xun, an A-list celebrity volunteered as their brand ambassador. SF also received a Rmb 500,000 (US\$81K) donation from HSBC Foundation to establish a drip irrigation project that will stabilise water supply for the farmers.

SF finds that fund raising is most effective when engaging directly with asset owners who share the same values. This experience is coherent with its strategy of engaging regularly with its investors. The Company provides quarterly reports to its investors that highlight quarterly financials and impact; business opportunities and operational setbacks; and areas where the company needs help from its stakeholders. Taking an open-minded approach helps expand the referral network.

**KPIs:** Improvement in farmers’ incomes; fair purchase price premium  
**Comments:** SF has been open minded yet careful in choosing its investors. They work with engaged investors who are ambassadors of their brand. There are venture capital funds that may battle bitterly over valuations. Some are less concerned about the long-term health and development of the business, as the focus is to track up and plan for exit the moment an investment is made. Social entrepreneurs will benefit from understanding that investors are capital providers as well as partners in growing the business and funding networks.

## Club Financing

Club financing is a form of private placement and deal sourcing, except that it is multiple-deal fund raising with regular community participants, rather than single-deal sourcing with an open and expanding network. Members of the “Club” typically meet on a regular basis to assess investment opportunities and make collective financing decisions.

The definitions of “clubs” could be formal or informal, as defined by whether there is a membership fee and membership associated benefits. The degree of collaboration also varies depending on club rules or practices. For example, L+H works with other foundations and HNWs on a regular basis based on established collaborations without a formal “club” structure. Giinseng36, charges a membership fee (which becomes part of the club’s communal fund) and the club retains proceeds from the exit of any investments for future investments. Others, such as the former Impact Investor Circle, charge a membership fee and a commission for sourcing deals, but do not mandate proceeds retainment<sup>37</sup>. Recently, there was the launch of impact funds, such as that from Social Impact Partners<sup>38</sup> and the Inclusive Growth Fund<sup>39</sup>. Their precise structures and mandates are work in progress.

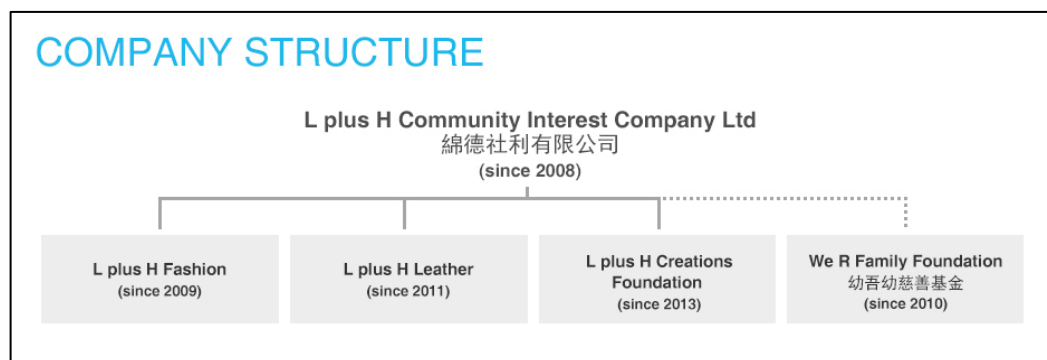


FIGURE 6  
L+H Organisation Chart

<sup>36</sup> <http://giinseng.org/>.

<sup>37</sup> <http://www.avantageventures.com/impact-investor-circle>.

<sup>38</sup> An impact fund backed by Asia Venture Philanthropy Network. Initial commitment comes from 5 partners with a total commitment amount of US\$ 2 million.

<sup>39</sup> Currently being set up by the Foundation of Amazing Potential. <http://amazingpotentials.org/>.

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## EXAMPLE 7 L Plus H (L+H)

<b>Website:</b>	<a href="http://www.lplush.com/">http://www.lplush.com/</a>
<b>Status:</b>	Umbrella Structure held by Community Investment Company Limited (Figure 6). Limited company and charitable institution (section 88 status in Hong Kong) for the underlying entities
<b>Mission:</b>	Bring manufacturing back to Hong Kong, enabling the less privileged to restore self-worth, dignity & hope through craftsmanship
<b>Seed capital:</b>	HK\$10 million equity (US\$1.3 million) and HK\$5 million loan (US\$645K)

Established in 2010, L+H was incorporated based on the Community Interest Company (CIC) Regulation under the UK Companies Act 2006, where (1) Shareholder dividends cannot exceed 35% of the company's profits; and (2) Assets can only be used either on the company or for social purposes.

Business growth in the first two years stood at 50% p.a. and remained at 20% p.a. in the last two years. By 2014, L+H have 80 workers and 3 designers in the fashion and leather arms of the Group. In 2010, L+H established We R Family Foundation. It is open to external donations for its pipeline of projects and initiatives. Their partners include UBS Optimus Foundation and Li Ka Shing Foundation. In 2012, L+H established L+H Creations Foundation to support performing arts programme. It is also opened to external funds.

<b>KPIs:</b>	New jobs created; new trainees performance; inventory control. For education programmes under the Foundation, academic achievement and percentage of improvement.
<b>Comments:</b>	Co-investment funds in businesses could be challenging because families often prefer to appoint their own executives to maintain management control and to educate next generations. It is easier to seek external funds for foundation activities.

## Competition-based Grant Financing

There are numerous entrepreneurship competitions in Hong Kong that provide grant capital as prize money and in-kind support as part of an incubation programme.

Started in 2007, the Hong Kong Social Enterprise Challenge (HKSEC) is an annual inter-collegiate social venture business plan competition organised by the Chinese University of Hong Kong. It aims to educate students and the public on social enterprise, and assists in turning creative business ideas into commercial ventures that promote social good. Over 4,600 students from 27 institutions have

generated over 800 business ideas<sup>40</sup>. Winners of the competition receive up to HK\$60,000 (US\$7,700) to implement their plan under the guidance of a dedicated mentor, usually an executive from a business or a NGO.

### **Example 8** **First Student-Driven Venture Philanthropic Fund**

**Website:** <http://www.bm.ust.hk/web/en-US/Pages/feature-stories-detail/46>  
**Status:** Credit-bearing course  
**Mission:** To nurture young minds through social entrepreneurship, cross-sector collaboration and experiential learning  
**Seed capital:** HK\$1 million (US\$129K) from Yeh Family Philanthropy (YFP)

HKUST launched an elective course on venture philanthropy and social entrepreneurship in 2013, with financial support from YFP. It is a credit-bearing course that provides students with a unique opportunity to work with leading social entrepreneurs and impact investors, and to be part of a multidisciplinary team that helps to solve real life social problems through business methods and disciplines.

Students conduct due diligence on businesses that they wish to work with and choose their social business partners. Working in teams, their deliverables include a funding pitch for a HK\$250,000 (US\$32,000) cash prize to be awarded to the winning enterprise at the end of the course. The funder does not participate in funding decision-making. The funding decision is made by a transparent voting system where votes are split between students, faculty, and an independent judging panel. The panel is composed of industry experts in social and sustainable finance, social entrepreneurship, corporate social responsibility, accounting, business and the non-profit sector.

**KPIs:** Number of students; attendance rate; student satisfaction  
**Comments:** The successful course has demonstrated how education can create long-term impact on individuals. Two MBA students established a partnership between their employer, an international airline, and the social business they worked with. One student connected a social business in the course with an international insurance company for corporate social responsibility work. One student set up her own social enterprise; and another took a year out to establish a social enterprise student association. These impacts are significant although they were not necessarily captured by the KPIs.

The Junior World Entrepreneurship Forum (JWEF) was an initiative created by EMLYON, a French Business School, and KPMG in 2008. The Forum aims to promote and accelerate junior entrepreneurship globally as a way to create wealth and social justice. JWEF Hong Kong was a 3-day event that took place in June 2014<sup>41</sup>.

<sup>40</sup> <http://hksec.hk/page/about-hksec>.

<sup>41</sup> [http://kto.hkbu.edu.hk/eng/channel.php?content\\_id=160](http://kto.hkbu.edu.hk/eng/channel.php?content_id=160).

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As part of the Forum, the Business Entrepreneurship Support & Training (BEST) of Baptist University, the organiser of the Forum, provided awards to the total of HK\$600,000 (US\$77,000), in cash and in kind, to two winning social enterprises<sup>42</sup>.

Started in 2010, the Hong Kong University of Science and Technology (HKUST) HK\$1 million (US\$129,000) competition is open to new business venture teams with at least one member who is a student, alumni, or staff of HKUST<sup>43</sup>. The top winners receive a HK\$550,000 (US\$71,000) cash prize to develop their businesses. Social enterprise, renewable energy and environmental related start-ups are encouraged to apply. Sponsors are corporates, HNWs and venture capital firms.

### *CHARACTERISTICS OF DIFFERENT FINANCING STRATEGIES*

Social impact innovators adopt different financing strategies depending on a range of factors, such as:

#### Culture of the Organisation

When social enterprises are successful, as defined by those that have demonstrated high impact, financial sustainability and a multiple year track record, the culture that underlies their business is distinctive. Their inclusive culture was noticeable through conversations with their engaged staff, which include people of difference and those who are not, minorities and new arrivals.

Taking a contrarian approach against the traditional philanthropic mindset of wanting to “help those who are unfortunate”, these enterprises have established a clear mandate to create empathy. From awareness raising exhibitions and themed events, to life stories writing, the focus of these services is to provide a channel of communication for those who may have been misunderstood, or have not had the chance to be understood. Their services support *all* who wish to overcome fear and prejudices against a special group. With a distinctive impact and business offer, these enterprises have been successful at attaining funding through corporate grants and private placement, with anchor support from founders and key shareholders.

Through experiential learning, customers, such as visitors of the centres, and students of the urban beekeeping workshops, have become beneficiaries of the social businesses themselves (see Example 1). Creating job opportunities for special groups is part of the holistic proposition that creates an empathetic and barrier-free society.

#### Nature of the Business

Aging population, environmental protection and sustainability are some key topics that are becoming mainstream, and where vast investment opportunities lie. Despite a trading culture that often dominates investors’ attitude, there are many individuals, families and institutions that invest according to their stated principles; some of them have been included in this Paper. Enterprises who can resonate with the values of capital providers are likely to attain their support. The challenge is in reaching out and identifying these like-minded financiers.

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<sup>42</sup> <https://www.facebook.com/besthkbu>.

<sup>43</sup> <http://onemilliondollar.ust.hk/documents/2014booklet.pdf>.

For *Hong Kong Recycles* in the responsible recycling sector and *One Earth Designs* in the clean energy sector (see Examples 3 and 4), crowd-funding platforms have proven to be effective, with the added benefit of customer engagement and profiling in the process.

For *Diamond Cab* in the elderly and barrier-free transportation sector and *Shangrila Farms* in the biodiversity and sustainable consumption sector (see Example 2 and 6), stakeholder management creates financial and business support.

#### Accessibility of Networks

For enterprises that have participated in the HKUST course with a student-driven venture philanthropic fund (see Example 8), entrepreneurs have identified that the most important “gain” from participating in the course is the people network. The enterprises have found new customers, staff, volunteers and business partnerships. Some also received significant media exposure and recognition<sup>44</sup>.

For deal-based private placement, entrepreneurs are recommended to take the time to understand the underlying interests of capital providers and the relationships amongst them. For *Dialogue in the Dark* (see Example 5), the founder and anchor investor was instrumental in creating a network through his in-depth understanding of the interests and expectations of all involved parties. Although the lockup period has passed, none of the seeders have exited the investment. They remain committed to the cause and the mission of the business.

For club financing, with a longer timeframe and expectations of more collaboration efforts amongst the parties involved, co-investment harmony determines success. This is particularly important if due diligence and associated costs for this work is shared. For *L Plus H* (see Example 7), the families and HNWs involved in the Community Interest Company Group have long-established relationships. The mutual trust and respect for participating parties contribute to a constructive co-financing journey.

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<sup>44</sup> Press release about the course: <http://www.ust.hk/about-hkust/media-relations/press-releases/pioneering-course-hkust-teaches-socially-useful-investment-tripartite-partnership/>. The media highlights key features of the course that combines entrepreneurship and investment, and the innovative impact analysis performed. Students of the course have also connected the social businesses that participated in the course with an international airline and a global insurance company to explore corporate social responsibility synergies.

# THE SOCIAL AND SUSTAINABLE FINANCE LANDSCAPE IN HONG KONG: AN EMPIRICAL STUDY ON FACTORS THAT AFFECT THE CHOICE OF FINANCING STRATEGY

## CONCLUSION

Through the author's first hand experience, live cases and interviews with capital providers and impact innovators, this Paper studies the characteristics and availability of social and sustainable financing in Hong Kong.

The Paper suggests that the dichotomy of financial and non-financial *return* can be interpreted more holistically. With a strong theoretical foundation, economists have long argued that one seeks to maximise one's *welfare* or *utility*, taking into account intangible return, such as the thrill of deviancy and the pleasure of altruism, when making economic decisions.

The Paper explores expectations mismatch between financiers and their funding organisations through the open sharing of thought processes that determine funding and business decisions, from both top-down and bottom-up perspectives.

They key lessons learnt are:

**There is room to grow the community of capital providers:** The estimated amount of capital available for social and sustainable finance in Hong Kong is US\$19 billion. 20% of the total, or US\$3.8 billion, comes from government grants. There is room for private capital to play a bigger role through strategic and/or venture philanthropy, impact investing and sustainable finance. *Engagement* through dialogue and experience sharing amongst the different types of capital providers helps establish a common mission, and to segment risk and return profiles, thereby growing the collaborative social and sustainable finance community.

**Fundraisers to put themselves into someone's shoes and take a layered capital approach:** Entrepreneurs consider funding needs from their own perspective. To be successful in fund raising, they are recommended to consider their financing proposition from the perspective of goal-alignment with the funders, and to consider a *layered capital* approach to financing – with grants and philanthropic funds that can afford total loss in the worst-case scenario to act as catalytic capital to drive innovation and social change. When a prototype product is available with demand from identified customer groups, angel and patient investment capital can be brought in. When business scales, commercial capital from institutional and mainstream investors can play a bigger role.

**Institutional stewardship drives supportive policy and regulations:** Institutional capital is vital for driving change and progress because of institutions' readily available financial power, human resources expertise, and fiduciary duty mandate. *Stewardship* is also necessary for developing soft infrastructure, covering policy and regulations that has a long-term impact on the functioning of the society and environment. Regulations such as that of the Community Investment Company (CIC) will create a transparent set of rules by which social businesses must operate, building confidence in, and attracting funds from, a variety of capital providers.

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THE SOCIAL AND SUSTAINABLE FINANCE LANDSCAPE IN HONG KONG:  
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## THE BANK CAPITAL REGULATION (BCR) MODEL

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**Abstract.** *The motivation of this article is to induce the bank capital management solution for banks and regulation bodies on commercial banks. The goal of the paper is intended to mitigate the risk of a banking area and also provide the right incentive for banks to support the real economy.*

**Keywords:** *demand deposit, macroprudential approach, off-balance-sheet (OBC) risks, general equilibrium, portfolio composition, minimum equity capital regulation.*

**JEL classification:** *C54; D58; G18*

### Introduction

In Europe, after the Basel 1 (1988) accord, the banking supervision Accords in Basel, Switzerland, Basel 2 (1999) and Basel 3 (2010) have been evolved. The issuer, the Basel Committee on Banking Supervision (BCBS), advised about credit risk (1988.07) at the Basel 1 and amended about market risk (1996.01) with the Basel 1 Amendment. In the revised framework of the Basel 2, operational risk (2004.06) was introduced and enhanced at the Basel 3 (2010.12). In this overall perspective, these Basel Capital Rules have been enhanced to the Basel 3. For example, the scope of operational risk is enlarged. This requires some reasonable motivation since banks face the situation to manage the cost to follow banking capital regulation rules. Of particular significance is that the government needs to regulate banks to prevent panic from the systemic banking crisis.

Much interest has been aroused in cascading failure of bank run prevention. For example, Friedman and Schwartz (1963) observe large cost imposed on the economy of United States caused by bank runs in the 1930s. Upon on much more recent data, in systemically important banking crises of the world from 1970 to 2007, the average net recapitalization cost to the government was 6% of GDP (Gross Domestic product). Fiscal costs associated with crisis management were averaged 13% for GDP (16% of GDP if expense recoveries are ignored), and economic output losses were averaged about 20% of GDP during the first four years of the crisis. Otherwise, if the government decides to adopt the Basel capital regulation framework, the adoption cost will influence the economy of countries. Either households or banks, related parties to economy should pay for the Basel capital regulation as the preventive method in the banking business cycle. The OECD study released on 17 February 2011, estimated that the medium-term impact of the Basel III implementation on GDP growth would be in the range of 0.05% to 0.15% per year. Economic output would be mainly affected by increase in banks' lending spreads, as banks pass a rise in bank funding costs, due to higher capital requirements, to their customers. Therefore, the situation is that banks are struggling to

manage the regulation cost and the government wants to defend about nationwide contagion of other banks.

### **The Macroprudential Approach to Financial Regulation covering On-balance-sheet and Off-balance-sheet (OBS)**

Insofar as systemic risk is concerned, risks that firms, households and reserve banks and commercial banks face are highly linked to each other. Seen from this point of view, the banking industry and the monetary policy have particular relevance to systemic risk.

*Macroprudential approach* is the method to solve the individual's decision problem in finance and the goal of the economic growth. Specifically, *systemic risk* is the risk having a macro origin caused by the asset-liability problem of on-balance-sheet can initiate the off-balance-sheet (OBS) problem.

Our starting point for the problem solving is that the crisis concerning the U.S. subprime mortgage crisis coincided with the U.S. recession of December 2007 - June 2009. It was triggered by a large decline in home prices caused by the expansion of household debt financed with mortgage-backed securities (MBS) and collateralized debt obligation (CDO). In tracing the crisis, it was not necessary to consider the bilateral problem of asset and liability. The argument about solutions of crisis attempts to identify the comprehensive solution of asset and liability or equity. Alternative investments related to collaterals beyond the on-balance-sheet reconstruct the problem to be considered as the breakdown of entire system.

Undoubtedly, it goes without saying that financial contagion problems through international banks should be measured in the manner of systemic risk management. The analysis should take macro origin and counterproductivity of banks and their borrowers. With the macroprudential approach, it is highly probable that systemic risk can be interpreted with the perspective of the static model of the general equilibrium because on-balance-sheet and off-balance-sheet (OBS) risks are structurally segmented annually or periodically by financial statements containing the balancesheet.

In the paper, I will introduce the method with the accounting and economic perspective. Even though domino effects or contagions can be understood as movements having the future tendency to figure out solutions toward the future, scope of regulation should be articulated by categorization of on-balance-sheet and off-balance-sheet (OBS) risks in the static model. Thus the macroprudential approach to financial regulation covering on-balance-sheet and off-balance-sheet (OBS) risks is intimately linked with the general equilibrium (GE) approach.

On-balance-sheet risks are presented in a fourfold manner and are divided into credit risk, market risk, liquidity risk and systemic risk. Assets of banks have credit risk and market risk. Credit risk is the risk that a borrower will default on any type of debt by failing to make required payments. Market risk is the risk of losses in positions arising from movements in market prices. In case of liquidity risk, there are two major situations. One is emergency capacity of banks. When an illiquidity event takes place, an affected bank typically must borrow funds at interest rates exceeding those paid by other institutions. Another is about the stability of the banking system in case of inducing a large number of depositors to seek withdrawals. I would say liquidity risk in regard of demand deposit is on-the-balance-sheet risks of banks. Credit, market and liquidity risk are portrayed in considerable individual details but systemic risk is negative externality or adverse spillover effect stemming from transaction in which they were not participants. Distinguished from credit risk containing sovereign risk (government risk), counterparty risk (unincorporated entities' risk exposed to financial risk, usually referring to

governments, national banks), systemic risk is the risk of collapse of an entire financial system or the entire market, as opposed to risk associated with any individual entity, group or component of a system. George G. Kaufman and Kenneth E. Scott (2003) define “systemic risk” in imprecise terms as below:

“Systemic risk refers to the risk or probability of breakdowns in an entire system, as opposed to breakdowns in individual parts or components, and is evidenced by comovements (correlations) among most or all the parts.”

Darryll Hendricks (2009), who is a practitioner, suggests a more theoretical definition from sciences in which the term originated:

“A systemic risk is the risk of a phase transition from one equilibrium to another, much less optimal equilibrium, characterized by multiple self-reinforcing feedback mechanisms making it difficult to reverse.”

Banks engage in a number of activities that yield income, entail expenses and manage risks from on-balance-sheet risks to off-balance-sheet risks. Depending on bank characteristics, Banks extend loan commitments, security loans and trade derivative securities. Through extended loan commitments, the borrower has a guarantee of credit at a given interest rate whenever desired during the specific period. The bank receives interest income on the portion of the credit line that the borrower draws upon, and the bank receives non-interest income on the unused portion. Whereas a loan commitment obligates a bank to bring a loan onto its balance sheet upon customers’ requests, securitization permits a bank to remove loans from a balance sheet. Trading derivative securities also proved to be significant source of revenues. This claim is supported by the survey (figure1) of David Van Hoose (2010), by the end of 2008, United States banks held a notional amount of derivatives totally more than 190 trillion dollar, of which about 150 trillion dollar of derivatives’ exposure was comprised of interest rate contracts.

**Table 2.1** Assets of U.S. commercial banks

Asset category	\$ Billions	%
Commercial and industrial loans	1,197.9	12.3
Consumer loans	847.4	9.0
Real estate loans	3,573.9	36.7
Interbank loans	364.6	3.6
Other loans	269.0	2.7
Total loans	6,252.8	64.3
Securities	2,017.7	20.7
Cash assets	247.1	2.5
Other assets	1,220.4	12.5
Total assets	9,738.0	100.0

(Source: Board of Governors of the Federal Reserve System, August 2008)

**Table 2.2** U.S. commercial bank liabilities and equity capital

Category	\$ Billions	%
Transactions deposits	579.1	6.0
Large time deposits	1,016.4	10.4
Savings and Small Time Deposits	4,171.6	42.8
Total deposits	5,767.1	59.2
Borrowings	1,744.8	17.9
Other liabilities	1,051.4	10.8
Total liabilities	8,563.3	87.9
Equity capital	1,174.7	12.1
Total liabilities and equity capital	9,738.0	100.0

(Source: Board of Governors of the Federal Reserve System, August 2008)

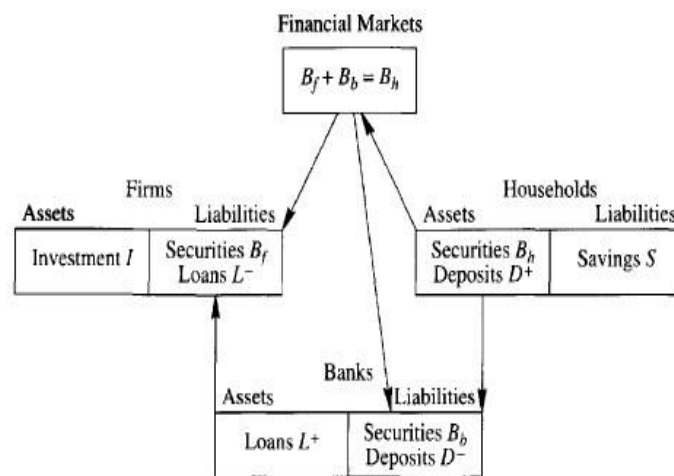
Figure 1 : Asset and liability of commercial banks

Ref: Vanhoose (2008)

## THE BANK CAPITAL REGULATION (BCR) MODEL

In relation to what I have previously said, the general equilibrium (GE) approach is useful to understand the overall mechanism of financial transaction and economic policy. The opposite mechanism of assets and liabilities on bank characteristic is different from usual balance sheets of firms. That is, banks regardless of central banks or commercial banks have characteristic that loans are assets of banks and deposits are liabilities.

All of these figures are emphasized by capital circulation of the Freixas-Rochet model (1999) in the figure 2 (as below). In conjunction with the Freixas-Rochet model, the equilibrium is detected with the general equilibrium approach with direct relevance to circulation of securities and stability of deposits. In the paper, the general equilibrium approach is upgraded with an adroit mixture of the balance sheet concept evaluating the value of economic entities and the income statement concept considering the profit to support the existence of financial entities.



*Ref : Freixas-Rochet (1999)*

Figure 2 : Equilibrium of financial markets

## Model

### *Saving preference of Consumers*

A microeconomic theory of banks had not been existed before the microeconomic foundation related to banks in the early 1970s. I would suggest add a banking sector at the Arrow general equilibrium model (1953) under the complete financial market assumption. The main purpose of the model has been to explore solutions about the problem of households, firms, banks and regulation bodies.

The two-period model ( $t=0,1,2$ ) with a unique physical good initially owned by consumers in the economy in which a continuum of ex-ante identical agents is each endowed with one unit of goods at the period  $t=0$ , and this good is to be consumed at each period of  $t=1$  and  $t=2$ . The consumer chooses her consumption profile  $(C_1, C_2)$  and the allocation of her savings  $S$  between bank deposits  $D_h$  and securities  $\sum_{s \in \Omega} P_s B_s^h$ , in a way that maximize her utility function  $\mu$  under her budget constraints:

$$\text{Max } \mu(C_1, C_2)$$

$$C_1 + \sum_{s \in \Omega} P_s B_s^h + D^h + S_h - \sum_{s \in \Omega} P_s B_s^h - D_h = W_1$$

$$C_2 = \Pi_f + \Pi_b + (1+r) \sum_{s \in \Omega} P_s B_s^h + (1+r_D) D_h + (1+r_h) S_h - (1+r) \sum_{s \in \Omega} P_s B_s^h - (1+r_D) D_h$$

Where  $W_1$  for her initial endowment of the consumption good,  $\Pi_f + \Pi_b$  for respectively profits of the firm and of the bank (distributed to the consumer-stockholder at  $t=2$ ).  $B^h$  denotes for securities,  $D^h$  for bank deposits.  $S_h$  denotes for savings.  $r$ ,  $r_D$ ,  $r_h$  are interest rates paid by securities, deposits and savings. For each future state of the world  $s$  ( $s \in \omega$ ) one can determine the price  $P_s$  the contingent claim that pays one unit of accounts in state  $s$  and nothing otherwise.

The consumer has a well-defined set of desires ("preference"), which can be represented by a numerical utility function. In addition, we assume that the consumer chooses optimally, in the sense that they choose the option with the highest utility of those available to them. It implies that a consumer is solving an optimization problem. An optimization problem has three key components.

a. **Selected object** The consumer chooses her consumption profile ( $C_1$ ,  $C_2$ ) and allocation of her savings  $S_h$  between bank deposits  $D_h$  and securities  $B^h$ . If real assets  $S_h - \sum_{s \in \Omega} P_s B_s^h - D_h$  is non-negative, it implies real assets are sufficient to support the household economy.

b. **The objective function** The consumer maximizes her utility function  $\mu$ .  $\mu$  is assumed to be increasing and concave. Notice that preferences are contingent states and do not fit the standard Von Neumann-Morgenstern representation. Incompleteness of preference becomes apparent that decision makers cannot make a decision in the ambiguous situation. However, even though one individual or one factor doesn't decide, the regulator decides the policy with a foretaste of what is to come after annual closing accounts.

c. **Constraints**

c.1 **Cash-in-advance**  $0 < D_h \leq W_1$ , The paper will be based on the Cash-in-advance constraint. This approach that was introduced by Clower (1967) is the requirement that each consumer or firm must have sufficient available cash before they can buy goods.

Price of security  $h$  under Uncertainty  $\sum_{s \in \Omega} P_s B_s^h$  (resp.  $\sum_{s \in \Omega} P_s B_s^f$ ,  $\sum_{s \in \Omega} P_s B_s^b$ ) implies the price of securities by the absence of arbitrage opportunities. A bank issues (or buys) a security  $h$  (intepreted as a deposit or a loan) characterized by the array  $B_s^h$  ( $s \in \Omega$ ) (resp.  $B_s^f$ ,  $B_s^b$ ) of each payoff in all future states of world  $\omega$

**Interior Solution** The consumer's program ( $P_h$ ) has an interior solution only when interest rates are equal:  $r = r_D$

c.2 **Preference of Savings** In the Arrow-Debreu model, money is redundant in the market. Households are indifferent about the composition of savings. In the paper, the household has preference to increase the budget to collect savings  $S_h$  and affected by risk

levels of securities, deposits and real assets. Savings  $S_h$  is the sum of Securities  $\sum_{s \in \Omega} P_s B_s^h$ , Deposits  $D_h$  and Real Assets  $S_h - (\sum_{s \in \Omega} P_s B_s^h + D_h)$ .

## d. Arguments

There are concerns about savings that are substituted into consumption by the household like Covas-Fujuta (2010). Diaz (2005) adds no capital requirement at basics to reduce consumption and increase savings by the household. Haslag (2001) assumed that return to money is positively related to the money growth rate that is a random variable, gross real returns to savings are random. His realized gross real return to savings indicates that the gross real return to savings is a weighted sum of capital and fiat money (which derives its value from government regulation or law, so called as 'fiat currency'). The weight is the share of agent's asset.

In the Waller model (2004), Savings are very passively selected by the household depending upon decisions at the previous period. Middle-aged agents have already earned their wage income, as the wage during period  $t$  was determined by the previous period's interest rates (a level of the capital stock). Also, they have already decided how much to consume and save (since savings are a fixed fraction of wage income), but they have not yet decided how to allocate their savings between capital and fiat currency. What these middle aged agents want at this point is just the highest possible interest rate between period  $t$  and  $t + 1$ , so that they can obtain the best possible return on their savings and can thus consume as much as possible during their period of old age. In the third period of life, retired agents consume their savings and exit the model.

Practically, Christensen-Meh-Moran (2011, Bank of Canada) mentioned, at the timing of events, households deposit savings at banks that use these funds as well as their own net worth to finance the entrepreneur's projects. In the investment frame, exiting (failing to return from the project) agents sell their capital for consumption goods and surviving agents buy this capital as part of their consumption-savings decision.

However, in reality, even though the agent has a house, they need to spend expenditure for renting, maintenance and extension of houses. Savings and real asset portion are large enough to make the loan from banks. It is hard to explain price fluctuation of houses and savings on the economy by depending upon the interest rate of capital stock and deposit, or perfect substitution of consumption. For households, the preference of savings is the matter about existence of household economy making future benefits and directly affecting to the welfare of any individual.

House-price appreciation by the model of Goodhart-Kashrap-Tsomocos (2012) is impressive. Reducing deposit defaults induces more savings circulated by the bank and less self-insurance and by the end, the reduction in self-insurance reduces the number of houses for sale in a good state, which means that house-price appreciation in the boom is higher than otherwise. Most of all, the market incompleteness with deadweight costs of default distorts the housing market. Wealthy agents endowed with houses make their saving decisions accounting for the possibility that deposits will not be fully repaid. When default penalties for banks are low, then households internalize risks putting less wealth into the banking system and hold more in the form of houses. This choice increases the supply of houses that is available in boom, which lowers house prices and raise welfare for agents entering the housing market at that time. To insure that house price reduction in the bad state of the world, households P and F are also presumed to have lower wealth. Likewise, the non-bank is endowed with lower capital in period 1 as well as in the bad state of the world. This model describes the house bubble phenomenon interestingly.

In the model of Lucas (1995), to support the incompleteness of markets, he pointed out savings that the young split their savings between bank deposits, which promise a fixed nominal return, and a bank equity, which yields an uncertain real dividend. In addition, because a constant fraction of initial wealth is saved, there is no distortion due to fixed nominal interest payments on deposits. Hence regardless of deposits, the bank equity is related to the real effect of monetary policy.

In the paper, at the framework of securities, deposits and real assets with savings, firstly, the relation between savings and real assets (especially houses) can be much more attached. Secondly, deposits included in the total saving amount which are escaped from the one-sided thinking that deposits are equal to savings and can be perfectly substituted to consumption. Thirdly, Securities at uncertainty are affecting to the investment portfolio of households. These dynamics are explained by the following academical detail.

Households choose  $(C_1, C_2, S_1, S_2, R_1)$  taking prices  $(W_1, W_2)$  as given. Formally, if we consider the 4-factor model containing banks, because banks have the special financial structure having deposits as liabilities and loans as assets, we need to have the different mindset from generally accepted accounting principles about debit and credit accounts. The general equilibrium (GE) diagram is similar with the balance sheet. Distinguishably, the money flow in the paper starts at the bank transaction which is “deposits and borrowings” as liabilities and “claims to corporate” as assets.

Then, deposits of household are the amount to be accumulated in banks. Conveniently, riskier investments than deposits for household are categorized as securities.

Savings are moving in the real household economy by capital circulation of securities, deposits and real assets. In addition, the welfare of each household is moving from dynamics of accumulated savings. In the overlapping generation model, wealth is always given and manages the household economy easily by each generation. In reality, one who didn't get a house as a legacy, she should spend quite a long time to have a house or rent a house. Attention about fundamental wealth related to non-working capital of a household economy should be emphasized. If the consumer spends his income entirely, the total amount  $W_1$  may be spent totally and can be bounded. In this manner, the household always has their fundamental welfare to manage the household economy and consumption can be naturally deduced from the framework of household economy. That is,  $W_1$  is the budget constraint and the market information is incomplete so we cannot deduce the real variable of consumption in reality.  $W_1$  and incompleted market information are not enough to deduce the real variable of consumption. In terms of the working capital, we are not so surprised to know that capital has various liquidities. For example, a household wants to spend money on a daily basis but should reduce the amount of money by spending it to have fundamental living basis like houses. In the paper, the financial budget constraint is bounded within the  $W_1$  except for  $S_1$  because  $S_1$  is the summation of securities, deposits and real assets. These are vital factors to operate household economy related to financial markets. The working capital concept at the household economy is evoked within the general equilibrium in the paper. In the perspective that the industrial characteristics of banks mainly operated by capital, it makes sense to us that consideration about the household economy should be balanced with the working capital concept of banks.

Then, why we need to define return  $R_1$  in this model? Simply, we think of three variables of  $W$  for endowment,  $S$  for savings and  $C$  for consumption. We assume that

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the concept of the golden-rule saving rate in *Chapter 1 of Barro and Sala-i-Martin*,  $n$  denotes for the constant exogenous population growth rate, and  $d$  is for the constant exogenous rate of depreciation of capital. We know the house saving rate is 5% (usually 2-11%, *OECD, Economic Outlook n.91, June 2012*). The amount of savings in the economy should grow as population grows. To support this insured saving amount caused by population growth, the return should be enough to make profits to cover the insurance expense in the economy with the general equilibrium (GE) perspective. Then, we can assume the worst senario like a bank-run case. Even though the fix amount of saving deposits is secured, the loss amount induced from total savings by the end - insured savings will go to the consumption part. In this overall perspective of an equilibrium, insuring savings of households seems plausible to support the economy of households, yet it requires further understanding about the profitable dynamic mechanism to operate the economic cycle. I would say the original form is mainly based on the BCR general equilibrium model diagram presenting as the balancesheet format as it can be because on-balance-sheet factors are reflected by two regards - the money flow perspective (profit) and the economic status perspective (net present value).

Original form (savings containing real assets)

$$\text{Max } \mu(C_1, C_2)$$

$$C_1 + \sum_{s \in \Omega} P_s B_s^h + D^h + S_h - \sum_{s \in \Omega} P_s B_s^h - D_h = W_1$$

$$C_2 = \Pi_f + \Pi_b + (1+r) \sum_{s \in \Omega} P_s B_s^h + (1+r_D) D_h + (1+r_h) S_h - (1+r) \sum_{s \in \Omega} P_s B_s^h - (1+r_D) D_h$$

Simplified form for calculation (savings containing real assets)

$$\text{Max } \mu(C_1, C_2)$$

$$C_1 = W_1 - S_1$$

$$C_2 = R_1 + W_2 - (1+r)S_1 - S_2$$

We have the first order condition of consumption at period 1 and 2 as below.

$$\frac{\partial \mathcal{L}}{\partial C_1} = \mu'(C_1, C_2) - \lambda = 0$$

$$\frac{\partial \mathcal{L}}{\partial C_2} = \mu'(C_1, C_2) - \lambda = 0$$

We know the Lagrange multiplier is 0 as  $\lambda = 0$ , by the  $\frac{\partial \mathcal{L}}{\partial S_1}$ , the first order condition of savings at period 1 and by the  $\frac{\partial \mathcal{L}}{\partial R_1}$ , the first order condition of return from initial investment. In addition, we get  $\lambda(1+r_1) = 0$  by the  $\frac{\partial \mathcal{L}}{\partial S_1}$ , the first order conditon of savings at period 1.

Therefore, what is get from checking the first order condition of household problem is that households consume today or tomorrow regardless of a banking money flow and it is not affected by the return of initial savings.  $\mu'(C_1, C_2) = 0$  denotes as time indifference about consumption preference. Households operate the household economy related to banks regardless of consumption for today or tomorrow. We conclude consumption

choice is not affected by return of initial savings  $r_1$  at the frame of banking money flow related to household.

The house expense portion in deposits held with MFIs (Monetary Financial Institutions) is the asset that can induce the future benefit and considered as priority to invest for a long time. For example, among loans to households of MFIs (5231 billion euros), loans for house purchase are 74%, 3858.1 billion euros in 2013. Note that we focus on the money transaction started from the bank balance sheet, in the concept of savings, House fee is deduced from  $S_h - \sum_{s \in \Omega} P_s B_s^h - D_h$  Where  $h$  is the period of household.

If we suppose the house fee is not contained in savings as below.

Simplified form for calculation (savings without real assets)

$$\text{Max } \mu(C_1, C_2) = 0$$

$$C_1 + \sum_{1 \in \Omega} P_1 B_1^h + D_1 = W_1$$

$$R_1 + C_2 + (1+r) \sum_{1 \in \Omega} P_1 B_1^h + (1+r_1) D_1 - (1+r) \sum_{2 \in \Omega} P_2 B_2^h - D_2 = W_2$$

$$\text{Also, } C_1 = (W_1 - S_1) + (S_1 - \sum_{1 \in \Omega} P_1 B_1^h + D_1)$$

The first-order condition

$$\frac{\partial}{\partial C_1} = \mu'(C_1, C_2) - \lambda = 0$$

$$\frac{\partial}{\partial C_2} = \mu'(C_1, C_2) - \lambda = 0$$

$$\frac{\partial}{\partial D_1} \lambda = 0$$

$$\frac{\partial}{\partial D_1} - \lambda (1+r_1) = 0$$

$$\frac{\partial}{\partial D_2} \lambda = 0 \quad \mu'(C_1, C_2) = 0$$

$$\frac{\partial}{\partial \sum_{1 \in \Omega} P_1 B_1^h} - \lambda (1+r_1) = 0$$

$$\frac{\partial}{\partial \sum_{1 \in \Omega} P_1 B_1^h} \lambda = 0$$

$$\frac{\partial}{\partial r_1} = \lambda (\sum_{1 \in \Omega} P_1 B_1^h + D_1) = 0$$

In conclusion,  $\mu'(C_1, C_2) = 0$  (time indifference about consumption preference) is the same condition regardless of real assets whether it is contained in savings or not.

Consumption choice is not affected by the interest rate  $r_1$  for initial savings (same condition regardless of real assets whether is contained in savings or not) and summation of securities and deposits  $\sum_{1 \in \Omega} P_1 B_1^h + D_1$ . Evidently, this condition appears in this banking model when we ignore real assets which is most stable in the household

## THE BANK CAPITAL REGULATION (BCR) MODEL

economy and can be interpreted as the big portion expense and the intangible asset producing future benefits. Therefore, with the condition that real assets are contained in savings, we can explain the house economy affected by the proportion of securities and deposits.

First intention to choose the general equilibrium model in the paper is to offer understandable method to the academic field and professional field. In the practice, the reserve bank has many methods and even they want more methods together in the weighted way. As I can do, I am intending to use real variables than random variables and a lot of Lagrange methods which is very general way to use the general equilibrium. The saving composition matter is more specifically supported by the following empirical data.

The deposit amount traded is different depending upon factor composition of economic models. For example, the European Central Bank announces the Euro areas' deposit amounts for the 4th quarter in 2013 in the Euro areas. Gross saving amount of households is 2521.3 billion euros (growth rate: 2.4). Deposits by non-financial corporations are 1870.7 billion euros. (growth rate: 6.7). Deposits by Insurance corporations and pension funds (financial intermediaries) are 653.2 billion euros. (growth rate: -5.3). Deposits by other financial intermediaries are 1854.1 billion euros (growth rate -3.1). Deposits by government are 440.8 billion euros (growth rate: -1.8). Deposits by non-euro area residents are 2522.9 billion euros (growth rate: -11.2). Therefore, without consideration about deposits by non-financial corporations (1870.7), the comparison between deposits by household (2521.3) and deposits by financial intermediaries (653.2+1854.1=2507.3) is naive explanation.

Loans for house purchase is 3858.1 billion euros. (growth rate: 0.7). It is Long-term liability affecting the existence of household economy. In addition, the total (7341.7) of deposits by insurance corporations, pension funds (653.2, -5.3), other financial intermediaries (1854.1, -3.1), non-financial corporations (1870.7), government (440.8), non-euro area residents (2522.9) are. Also, total (7752.2) of deposits by household (2521.3, 2.4) and Loans for house purchase (3858.1, 0.7) and other loans (796.7, -1.6), consumer credit (576.1, -3.0) are.

Table 1: Empirical balance when the capital of a household economy is concerned

	(billion euros, growth rate)
Loans for house purchase	insurance corporations and pension funds
(3858.1, 0.7)	(653.2, -5.3)
other loans (796.7, -1.6)	other financial intermediaries (1854.1, -3.1)
consumer credit (576.1, -3.0)	non-financial corporations are (1870.7, 6.7)
	government (440.8, -1.8)
	non-euro area residents (2522.9, -11.2)
total 7341.7	total 7752.2

*Ref: European Central Bank, the 4th quarter in 2013*

Savings  $S_h$  are the sum of Securities  $\sum_{s \in \Omega} P_s B_s^h$ , Deposits  $D_h$ , Real assets  $S_h - \sum_{s \in \Omega} P_s B_s^h - D_h$ . Households try to control the balance of assets and liabilities because in the situation of uncertainty, to maintain enough Deposits  $D_h$  for the economic existence of households, households need to invest on securities as of  $\sum_{s \in \Omega} P_s B_s^h$  posed on uncertainty conditions. Mainly, real assets imply the budget of houses managing the residence and invested real assets. For example, if the household has an apartment and there is the redundancy after spending the investment on securities and deposits, it can be the maintenance fee for house decoration or big furniture purchases.

The importance of portion for houses is considerable. Otherwise, if real assets are negative, hence, savings of households are less than the amount of securities and deposits. Even though, the amount of operation in the household is enough with securities and deposits. In the conservatism on the house budget, we can consider the effect on housing. In the paper, Houses of households is considered as future economic assets that support each member of households to make productions.

Through the general equilibrium approach, the link from the bank problem to the household problem is naturally connected. Also, the following technical finding by usage of same accounts at the household problem induces direction of regulation on banks like the portfolio analysis and initial GDP consideration. The following are technical findings with saving preference.

Suppose that  $\exists s \in \{G, B\}$ ,  $G=Good$ ,  $B=Bad$ . In the case 1, risk aversion is a  $s$  below. (resp. risk-taking case)

$$\Omega = \{G, B\}, C_1 + \sum_{s \in \Omega} P_s B_{s=B}^h + D^h + S_h - \sum_{s \in \Omega} P_s B_{s=G}^h - D^h = W_1 \quad (1)$$

In this case, portfolio analysis should be detected by regulation because the situation can be changed depending on the status.

In the case 2, incompleteness preference can be considered.

$\Omega = \{G, B, \text{no choice}\}$ , no choice can be selected by the choquet expectation  $CEv(\mu(x)) = \min_{\Pi \in \text{core}(v)} E_{\Pi}(\mu(x))$  where  $\text{core}(v) = \{\Pi : \Delta S : \Pi(A) \geq v(A) \text{ for all } A \subseteq S\}$

$$C_1 + 0 + D^h + S_h - 0 - D^h = W_1 \text{ and } D^h \text{ offset, hence } C_1 + \frac{C_2}{1+rh} = W \quad (2)$$

Initial GDP is caused by partition of initial endowment that is combination of consumption set. Hence, regulation direction is originated from initial GDP in this case.

*Borrowing composition of firms – additional session is in the Part IV.6*

## THE BANK CAPITAL REGULATION (BCR) MODEL

The firm chooses its investment level  $I$  and its financing (through Real Assets  $\sum_{s \in \Omega} P_s B_s^h + D_h$ , Liabilities to banks  $\sum_{s \in \Omega} P_s B_s^h - L_{fr}$  (Or Liabilities to central banks  $L_{fr}$ ) in a way that maximizes its profit:

$$\text{Max } \Pi_f(P_f)$$

$$\Pi_f = f(I) + r_f (\sum_{s \in \Omega} P_s B_s^h + D_h) - r_L^{\text{bank}} (D_h + \sum_{s \in \Omega} P_s B_s^h - L_{fr}) - r_L^{\text{fr}} L_{fr}$$

$$I = S_h = D_h + \sum_{s \in \Omega} P_s B_s^h$$

Where  $f$  denotes the production function of the representative firm.  $r_f$  is the premium of firm's real assets.  $r_L^{\text{bank}}$ ,  $r_L^{\text{fr}}$  are interest rates on bank loans and federal reserve bank loan.  $D_h$  denotes for bank deposits.  $B_h$  denotes for securities. Especially  $B_{fr}$  denotes for securities of reserve banks.  $L_{fr}$  are loans claimed by the firm to the reserve bank. For each future state of the world  $s$  ( $s \in \Omega$ ), one can determine the price  $P_s$  of the contingent claim that pays one unit of accounts in a state  $s$  and nothing otherwise.  $I$  is the investment level and  $S_h$  denotes for savings.

Interior Solution  $P_f$  has an interior solution only when:  $r_f = r_L^{\text{bank}} = r_L^{\text{fr}}$

The Modigliani-Miller (MM) theorem projects a theme of a theorem on capital structure. The basic theorem states that, under a certain market price process (the classical random walk) and an efficient market, in the absence of taxes, bankruptcy costs, agency costs and asymmetric information, the value of a firm is unaffected by how that firm is financed. Firms are indifferent about the composition of borrowings. Given the proposition II of the Modigliani-Miller (MM) theorem, a higher debt-to-equity ratio leads to a higher required return on equity because of the higher risk involved for equity-holders in a company with debt.  $r_E = r_0 + \frac{D}{E} (r_0 - r_D)$  where  $r_E$  is the required rate of return on equity or cost of equity,  $r_0$  is the company unlevered cost of capital (ie. Assume no leverage,  $r_D$  is the required rate of return on borrowings or cost of debt and  $\frac{D}{E}$  is the debt-to-equity ratio under two assumptions: (1) no transaction costs exist. (2) individuals and corporations borrow at the same rates. However, on the surface, given same ratios of  $\frac{D}{E}$ , two different sized banks are distortly interpreted. Even though this proposition is induced in the absence of the bankruptcy costs, merges of banks like “too big to fail”, so called “the size game among big banks, are considerable. Thus it is certainly worth inquiring  $D+E$  behind it's apparent dynamics of  $\frac{D}{E}$ .

The BCR model provides a key with which to unlock riddles of firms' borrowing compositions. The borrowing composition of firms imparted dynamics with the preference to maintain Real Assets  $\sum_{s \in \Omega} P_s B_s^h + D_h$ . Regardless of equilibrium, firms prefer to loan from central banks (so called as bonds) than commercial banks. Among the  $D_h$  and  $\sum_{s \in \Omega} P_s B_s^h$ , Firms prefer to have  $D_h$  because of financial stability and preference about certainty. The model reflects the tendency of banks toward the big size with Real Assets. In the economic existence respect of banks, banks have responsibility

to operate the dynamics of the debt-to-equity ratio  $\frac{D}{E}$  and maintain the economic entity of Real Assets  $D+E$  in the economy of countries.

Given the firm's problem, we have ambiguity about change of firms because of investments or loan status. Precise explanation about the relation with commercial banks and central banks should be offered. In the general equilibrium (GE), firms choose labor cost and manage the capital for production or business process but labor effect is hard to be clarified with certain connection of commercial banks and federal banks. Hence, the transaction like loan movements (i.e. liabilities to banks, liabilities to central banks, investments) can be selected to explain in this paper. Additionally, Investments is regarded as Real assets to support existence of business entities. It implies firms want to acquire investment budget to maintain real assets that can be requisite for existence of firms. Therefore, by having borrowing preference to have much more stability between liabilities to banks and central banks (so called as bonds), firms pursue to obtain stability to acquire the investment up to the stability of Investments which can be equal to Real Assets. Thus, we can explain dynamics of investments and loans with the firm's property.

There are many arguments to explain the ambiguity of firms with informational asymmetry, shock absorbed by effective capitals, securities, technical shocks, and interest rates on loans and borrowing constraints.

Boyd-Chang-Smith (2004) points out two informational asymmetry problems of firms: The moral hazard problem arises because any borrower's project choice is not observable. Also, the costly state verification (CSV) problem arises because, for either type of projects, the return of investments cannot be freely observed by any agent other than the project owner.

In the Nelson-Pinter (2012) model, at the production function of cobb-douglas standard form, there is a shock variable to the quality of physical capitals. When we face the unanticipated exogenous declines in the productive capacity of physical capitals, available "Effective capitals" for use in the production is diminished. This intends to consider the effect on banks since banks hold claims on physical capitals directly on their balance sheets, this will be loss for banks, which must be absorbed or passed on to outside creditors.

In the Dewatripont-tirole (2012) model, he argues that securities are characterized not only by income rights but also by control rights. Optimal corporate choices are the time-inconsistency. Investors in control of corporate choices must face an incentive that differs from firm-value maximization. So a banking manager has no financial resources to cover an investment cost and turns to investors for financing. The capital structure - that is, the allocation among investors of contingent cash-flow and control rights - is designed at this financial stage.

Covas Fujita (2010) mentioned that the technology shock is distributed as standard normal distribution. Labor and capital rental markets are assumed to be competitive.

Diaz (2005) thinks that since interest rates on loans are greater or equal than the discount rate, firms prefer to use internal sources (i.e. cash flows) rather than external financing. In addition, he induces that capital depreciation is paid out of firm's cash flow and net investment is entirely financed with debting. In the model of Nuno-Thomas (2013), they assumed that the firm can only borrow from banks located on the same island.

In the static model of general equilibrium (GE), if we know the GDP endowment as the exogenous factor, we can calculate more at the firm's problem. Indeed, the analysis

about GDP like Consumption to GDP, Government Expenditure to GDP, Fixed Capital Formation to GDP, Export to GDP, Net Export to GDP, Money to GDP except for inflation rate and nominal interest rate are used with the general equilibrium (GE) approach.

The effort to figure out ambiguity of firms and overall perspective analysis display a coherent structural and compositional understanding. Then, how we can measure the firm's productivity relating to the banking area in general equilibrium (GE)? The classical viewpoint that there are three basic factors of production, (land, labor and capital) at the production function. Total-factor productivity (TFP) is different from the traditional calculation measured by inputs of labor and capital. The TFP calculation is measured as a Solow residual affecting in total output and not caused by inputs. The equation  $Y = A \times K^\alpha \times L^\beta$  in Cobb-Douglas form represents total output (Y) as a function of total-factor productivity (A), capital input (K), labor input (L), and the two inputs' respective shares of output ( $\alpha$  and  $\beta$  are the capital input share of contribution for K and L respectively). The problem is that units of A do not admit a simple economic interpretation. We have two ways to calculate TFP (Chen, 2011). Firstly, we obtain the TFP measurement by estimating a production function. Secondly, we establish a model to find the determinant of TFP and uncover whether financial factors exert any effects on TFP. Materials and energy are secondary factors because they are from land, labor and capital.

It can be puzzled whether duplicated or missed amounts are existed in the general equilibrium (GE). The equity portion as capitals is in the liabilities of firms and the wage portion as expense is in the eliminated account of firms. With this production function measure, we are talking about the exact asset amount of firms that is the part of equity at the same time. Let's go back to the definition of the production function. Factors of production are inputs to the production process. Finished goods are the output and the relationship of input and output is the production function. The important point is that we cannot exaggerate too much about money. Indeed, the classical viewpoint is that money is not contained in capital because it is not directly produce any good so it is hard to be related to consumptions of goods at the problem of household.

In the paper, firstly, we are focusing on "capital" including the "financial capital." Financial capital is raised to operate and expand a business and it is net worth (assets minus liabilities) including money borrowed from others. Originally, "Capital" means goods that can help produce other goods in the future, the result of investment. Considering a labor is not realistic because the number of employees at the firm is hard to be considered at the banking problem. Already we consider equity (asset-liability) is the result after considering labor cost. Redundant firm size variable can evoke the biased information if we pursue obtain the general equilibrium (GE) in this model. It's true that wage is the large portion of input at the firm and should be considered distinguishly. However, for the special industry like banking, we need to clarify needed variables to figure out the problem in the academic field for future and in the realistic world for present.

If we contain banks and federal banks in the banking model, we add the real asset variable. It implies the capital concept is naturally inducing the working capital concept. Adding the shock variable to the quality of physical capital (Nelson-Pinter 2012, Gertler-Karadi 2011, Gertler-Kiyotaki 2010) is hard to be measured and needed to be predicted with a lot of unexpected uncertain situation.

Also, the conservative business cycle is deduced. If we assume that multiplier  $\mu$  exists,  $\mu(D_h + B_h) > D_h + B_h - L^{fr} > L^{fr}$ . This assumption exactly reflects the preference of

safetier capital type like real assets > a government bond (lower interest rate on a bond than a loan) > a loan.

### *Demand deposit of bank*

**Scope of Bank** Domestically chartered commercial banks, country branches and agencies of foreign banks, Edge Act corporation.

The bank chooses its supply of loans to firms  $D_h + B_{fr} + L_{fr}$ , its demand for deposits  $D_h$ , and the borrowing  $B_{fr} - L_{fr}$  in a way that maximized its profit:

Max  $\Pi_b(P_b)$

$$\Pi_b = r_L^{\text{Bank}} (D_h + \sum_{s \in \Omega} P_s B_s^h - L_{fr}) - r_{Lfr} (\sum_{s \in \Omega} P_s B_s^{fr} - L_{fr}) - r^D D^h$$

where  $r_L^{\text{Bank}}$ ,  $r_{Lfr}$  are interest rates on bank loans and federal reserve bank loan.  $D_h$  denotes for bank deposits.  $R_D$  is the interest rate paid by deposits.  $B_s^h$  denotes for securities. Especially  $B_s^{fr}$  denotes for securities of freserve banks.  $L_{fr}$  are loans claimed by the firm to the reserve bank.

The bank maximizes the profit by choosing its supply of loans  $L^+$ , its demand for deposits  $D^-$  and the issuance  $\sum_{s \in \Omega} P_s B_s^b$ .

Max  $\Pi_b(P_b)$

$$\Pi_b = r_L L^+ + r \sum_{s \in \Omega} P_s B_s^b - r^D D^- L^+ = \sum_{s \in \Omega} P_s B_s^b + D^-$$

The part of banks' problem provides a context which capital circulation within banks is required by other main factors of economy. The problem of banks is presented without equities of banks in fairly balanced debits and credits of banks. This main issue has been to handle the demand deposit in the banking area and it related to the money supply closely. In the data of Board of Governors of the Federal Reserve System, demand deposit and money stock data have been collected from Demand Deposit, Currency and Related items (J.3, Semi monthly) in 1960 to Money Stock Measures in 2012.

Under the fractional reserve banking, deposit is important indicator for economy because of money multiplier effect. Considering Moneysupply = currency+deposits, demand deposit which has highest liquidity among deposits on the balance sheet of banks is directly related to the M1 of central banks. Diamond and Dybvig model (1983) explains why bank runs occur at an undesirable equilibrium and why banks issue demand deposits that are more liquid than their assets by providing better risk sharing among people who need to consume at different random times. The key to describe the rationality both for the existence of banks and for their vulnerability to runs is the illiquidity of assets, especially by the demand deposit. His conclusion on the bank runs as better indicator of economic distress than money supply is too quick because there is the duplicated section of deposits and money supply. A bank run is the sudden withdrawal of deposits of just one bank and money supply contains the currency section.

In case of bank runs, the government of country should prepare the recovery solution for economy. Regularly, given information about money supply, the government can figure out about both moving of currency and deposits. Krugman (2006) points this out that deposits are usually considered part of the narrowly defined money supply, as they

can be used, via checks and drafts, and a means of payment for goods and services and to settle debts. The money supply of a country is usually held to consist of currency plus demand deposits. In most countries, demand deposits account for a majority of the money supply. To explain the correlation between deposit (demand deposit) and money supply, bank runs can be interpreted as the sudden constraint of deposit and money supply. We research on indicators of economic crisis so economic crisis is not the indicator to analyse the status of economy.

Gorton and Pennacchi (1990) assume that the uniqueness of demand deposits roles as a desirable medium of exchange so the existence of demand for privately produced riskless trading securities induces issuing demand deposits by banks. Actually, under the fractional reserve banking, a bank deposit is not a bailment that implies physical possession of personal property. It moves safely upon the banking revenue process.

Firstly, the property of customer was deposited. In turn, the customer receives an asset called the deposit account. Finally, the deposit account is the liability of the bank on its balance sheet. On the balance sheet of Liabilities of all commercial banks in the United States (2014.01), 70% is the deposit account. The circulation of deposits is important in economy. David Vanhoose (2010) categories the deposit into three sections like transaction deposit, large-denomination time deposit, saving deposits and small-denomination time deposits, at the United States commercial bank liability and equity capital. Transaction deposit contains non-interest-bearing demand deposits. Transaction deposit is 6% among total liabilities and equity capital of bank balance sheet.

Dewatripont-Tirole (2012) points out that deposit insurance is the prevention of banks runs following the Diamond-Dybvig (1983).

In the model of Boyd-Chang-Smith (2004), even though project return is safe because of a large number of borrowers, he assumes possibility for banks to fail.

Regardless of a single borrower and aggregate of borrower, potential bankers can suggest needless to operate the bank.

In the model of Covas-Fujita (2010), the bank can raise funds through either deposits or equity so holding equity involves the equity issuance cost.

Diaz model (2005) also try to select the considerable sources. For example, firms only source of financing is bank lending the bank can claim the full amount of firm's cash flow. The equity of banks moves under upper limit of dividend (under the hypothesis that the bank can turn equity into dividend with restriction) because of balance sheet constraint.

Goodhart-Kashrap-Tsomocos (2012) mentioned shadow banking. The securitized loans, called mortgage backed securities (MBS) can be sold to the non-bank and the non-bank will finance the purchase with a repo loan from the bank (that will have the MBS as collateral)

## *Federal Reserve Banks and general equilibrium (GE)*

The Federal Reserve Bank chooses its investment level  $I$  and its financing (through real assets  $D_h + \sum_{s \in \Omega} P_s B_s^h$ , Liabilities to bank  $D_h + \sum_{s \in \Omega} P_s B_s^h - L_{fr}$  (or Liabilities to central bank  $L_{fr}$ ) in a way that maximizes its profit:

$$\text{Max } \Pi_b(P_b)$$

$$\Pi_f = f(I) + r_f(D_h + \sum_{s \in \Omega} P_s B_s^h) - r_L^{\text{Bank}}(D_h + \sum_{s \in \Omega} P_s B_s^h - L_{fr}) - r_L^{\text{fr}} L_{fr}$$

$$I = S_h$$

Where  $f$  denotes the production function of the representative firm.  $r_f$  is the premium of firm's real assets.  $r_L^{\text{Bank}}$ ,  $r_L^{\text{fr}}$  are interest rates on bank loans and federal reserve bank loan.  $D_h$  denotes for bank deposits.  $B^h$  denotes for securities. Especially  $B^{\text{fr}}$  denotes for securities of federalreserve banks.  $L_{\text{fr}}$  are loans claimed by the firm to the reserve bank. For each future state of the world  $s$  ( $s \in \omega$ ), one can determine the price  $P_s$  of the contingent claim that pays one unit of account in state  $s$  and nothing otherwise.  $I$  is the investment level and  $S_h$  denotes for savings.

Interior Solution  $P_f$  has an interior solution only when:  $r_f = r_L^{\text{Bank}} = r_L^{\text{fr}}$

### *General Equilibrium (GE)*

General equilibrium (GE) is characterized by a vector of interest rates ( $r, r_D, r_h, r_f, r_L^{\text{Bank}}, r_L^{\text{fr}}$ ) and three vectors of demand and supply levels ( $C_1, C_2, \sum_{s \in \Omega} P_s B_s^h, D^h$ ) for the consumer, ( $I, \sum_{s \in \Omega} P_s B_s^h, D^h, L_{\text{fr}}$ ) for the firm, ( $L_{\text{fr}}, \sum_{s \in \Omega} P_s B_s^h, D_h, \sum_{s \in \Omega} P_s B_s^{\text{fr}}$ ) for the bank and ( $D_h, \sum_{s \in \Omega} P_s B_s^h, L_{\text{fr}}$ ) for federal reserve banks.

Each agent behaves optimally. (i.e., his or her decisions solve  $P_h, P_f$  or  $P_b$  respectively.

Each market clearing

$I=S$  (Good market)

$D_h(\text{Firm}) - D_h(\text{Firm}) + D_h(\text{Household}) - D_h(\text{Household}) + D_h(\text{Bank}) - D_h(\text{Bank})$

(Deposit market)

$L_{\text{fr}}(\text{Firm}) - L_{\text{fr}}(\text{Firm}) - L_{\text{fr}}(\text{Bank}) + L_{\text{fr}}(\text{Firm}) + L_{\text{fr}}(\text{FR:Federal Reserve Banks}) - L_{\text{fr}}$

(FR) (Credit Market)

$B_s^h(\text{Firm}) - B_s^h(\text{Firm}) + B_s^h(\text{Household}) - B_s^h(\text{Household}) + B_s^{\text{fr}}(\text{Bank}) - B_s^{\text{fr}}(\text{Bank}) + B_s^{\text{fr}}(\text{FR}) - B_s^{\text{fr}}(\text{FB})$  (Financial market)

It is clear in this model that the only possible equilibrium is such that all interest rates are equal:  $r = r_L = r_D$

## THE BANK CAPITAL REGULATION (BCR) MODEL

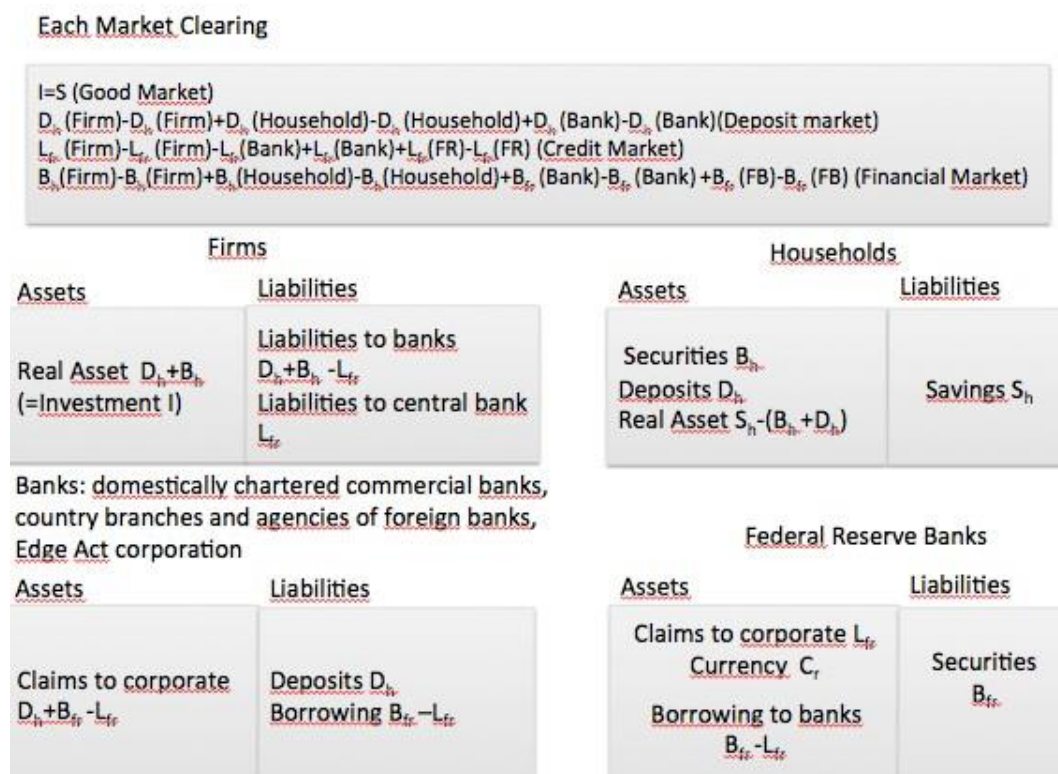


Figure 3: General Equilibrium in the BCR model

(Result) Arrow (1953)

If firms and households have unrestricted access to perfect financial markets, then at the competitive equilibrium, banks make zero profit and the size and composition of balance sheet (banks) have no impact on other economic agents.

(Result) Cho (2014)

If some accumulated variables are not negative, for example, the components Investment I, Savings  $S_{fr}$ ,  $L_{fr}$  are not negative, there is the equilibrium in the economy and the existence of each factors like firms, Households, Banks, Reserve Banks is fulfilled. The size of banks is affecting on each agent because equity capitals depend on previous deposits. Depending the change of bank size influencing on total deposits  $D_{fr}$ , the liability of firms is affected by liabilities to banks  $D_{fr}+\sum_{s \in \Omega} P_s B_s^{fr}-L_{fr}$ , deposits of household  $D_{fr}$  and real assets of households and firms. This is supported by the following the process of equity capital multiplication.

### Effects of Equity Capital Regulation

*Additional explanation about the borrowing composition of firm's problem – The portfolio composition effected by the minimum equity capital regulatoion.*

In the model of Kahane (1977), the minimum capital requirement causes an unintended result: it worsened, rather than improved the intermediary's condition and increases its probability of ruin. He checks this calculation with the ruin constraint and given standard deviation of rate of return at the portfolio composition of liability, stock and bonds.

In this paper, with the portfolio of risky portfolio and stable portfolio, explanation will be easier to be understood why minimum equity regulation induces for banks to operate riskier portfolio. In addition, it intends to reduce procyclicality (to the financial shocks) and promote the countercyclical buffer.

If we assume that the bank manages a risky portfolio with an expected rate of return of 17% and a standard deviation of 27%. The expected rate of return on equity is 7% and even though, there is pressure to raise the required equity every period, liability is same every period. The bank tries to meet the bank capital condition regulated by financial intermediaries so the bank should operate much more riskier portfolio comparing to the previous period as following.

Table 4: Effects of Increasing the Equity at the Portfolio Composition

Period	Required Equity, Liability	Portfolio composition (risky portfolio, stable portfolio)
1	12 (12%), 88(88%)	(-61.6%, 161.6%)
2	13 (13%), 88(87.12%)	(-61 %, 161 %)
3	14 (14%), 88(86.72%)	(-60.4 %, 160.4 %)

*Ref : author, 2014*

To calculate the portfolio composition, we calculate the expected value (Mean).

$$\text{Mean } 0.12(12/100) \times 0.07 + 0.88 \times 0 = 0.0084$$

$$0.1287(13/101) \times 0.07 + 0.8712 \times 0 = 0.0090$$

$$0.1372(14/102) \times 0.07 + 0.8672 \times 0 = 0.0096$$

Suppose that the bank decides to invest in the portfolio having a proportion Y of the total investment budget so that the overall portfolio will have an expected rate of return as above.

We know an expected rate of return of a risky portfolio  $R_p$  is 17% and an expected rate of return of a stable portfolio is 7%. Hence, we get the risky portfolio proportion Y.

Table 5: Risk Portfolio proportion Y

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$R_f + (R_p - R_f) \times Y$	Proportion Y
$0.07 + 0.1 \times Y = 0.0084$	-0.616
$0.07 + 0.1 \times Y = 0.0090$	-0.61
$0.07 + 0.1 \times Y = 0.0096$	-0.604

## THE BANK CAPITAL REGULATION (BCR) MODEL

Thus, in order to obtain a mean return of 0.84%, 0.90%, 0.96%, the bank must invest -61.6%, -61%, -60.4 of total funds in the risky portfolio and 161.6%, 161%, 160.4% in stable portfolio.

Standard deviation that implies the probability, to get mean of returns, is also increasing.

Standard Deviation

$$0.12 \times 0.27 = 0.0324$$

$$0.13 \times 0.27 = 0.0351$$

$$0.14 \times 0.27 = 0.0378$$

*Previous deposit affects optimized equity capital*

Table 6: Total Optimized Equity Capital

n	Deposits	Borrowings	OptimizedEquityCapital
n = 0	$D_0 = 1$	-	-
n = 1	$D_1 = (1 - \beta - K)$	$B_1 = (1 - \beta)$	$OEC_1 = K$
n = 2	$D_2 = (1 - \beta - K)^2$	$B_2 = (1 - \beta)(1 - \beta - K)$	$OEC_2 = K(1 - \beta - K)$
n = 3	$D_3 = (1 - \beta - K)^3$	$B_3 = (1 - \beta)(1 - \beta - K)^2$	$OEC_3 = K(1 - \beta - K)^2$
...	...	...	...
n = k	$D_k = (1 - \beta - K)^k$	$B_k = (1 - \beta)(1 - \beta - K)^{k-1}$	$OEC_k = K(1 - \beta - K)^{k-1}$
...	...	...	...

[ $\beta$  = restriction of borrowing] Then, Borrowings can be executed between Deposit 1 and Restriction  $\beta$

[Balance sheet equality constraint]  $D_n = B_n - OEC_n$

Hart and Jaffee (1974) analyzed the properties of the feasible and efficient set with the assumption that the initial equity capital is zero (i.e.  $K=0$ ). However, it is possible that the intermediary's equity is zero in the substantial degree of leverage (high liabilities to equity ratios  $\frac{EquityCapital}{Dh+Bfr+Lfr}$ ). Then, we should assume that the equity is negligible.

In the paper as the same as KAHANE (1977), we assume the equity is positive ( $K > 0$ ) so that the opportunity set does not pass through the origin (i.e. the vector of Deposit D, Borrowing B, Optimized Equity Capital = 0 give an infeasible solution).

Then theoretical superior limit for deposits is defined by the following:

$$\text{Deposits} = \sum_{n=0}^{\infty} (1-K-\beta) = \frac{1}{K+\beta} \quad (1)$$

Theoretically, superior limit for the equity capital by the firm is defined by the following:

$$\text{OptimizedEquityCapital} = K \times \text{Deposit} = \frac{K}{K+\beta} \quad (2)$$

And the theoretical superior limit for total borrowings in banks is defined by the following:

$$\text{Borrowings} = (1-\beta) \times \text{Deposits} = \frac{1-\beta}{K+\beta} \quad (3)$$

The process described above by the geometric series can be represented, where Borrowings at stage k are a function of deposits at the precedent stage:

Optimized Equity Capital at stage k is a function of the deposits at the precedent stage:

$$\text{OEC}_k = K \times \text{D}_{k-1} \quad (4)$$

Hence, if the optimized equity capital depends on the initial deposit and assume the terminal condition of bank is liquidation of bank deposits.

(Result) Hence, Optimized Equity Capital depends on the previous deposit. In addition, deposit insurance cost also increases because deposit insurance depends on the number of household.

Deposits at stage k are the difference between additional borrowings and optimized equity capital relative to the same stage:  $\text{D}_k = \text{B}_k - \text{OEC}_k$

In the model of Gorton-Winton (1995), bank size is given. In the theorem of Modigliani-Miller, the size and composition of banks' balance sheets have no impact on other agents. However, as population grows, insured deposits will increase. Then, the bank size should grow so bank size growth concern should be measured.

*K index for the indicator of risk taking*

Define the equity capital ratio with respect to total liabilities and equity capital,  $\frac{\text{EquityCapital}}{\text{Dh}+\text{Bfr}-\text{Lfr}}$ ,  $K \in (0,1)$ , the borrowing (from federal banks) ratio  $\frac{\text{Bfr}-\text{Lfr}}{\text{Dh}+\text{Bfr}-\text{Lfr}}$ ,  $\beta \in (0,1)$ .

## THE BANK CAPITAL REGULATION (BCR) MODEL

Suppose the demand for funds is unlimited, by summing up two quantities, the theoretical equity capital multiplier is defined as:

$$k = \frac{\text{Deposits} + \text{Optimized Equity Capital}}{\text{Borrowings} + \text{Optimized Equity Capital}} = \frac{1+K}{K+\beta}$$

where the equity capital ratio with respect to total liabilities and equity capital,  $\frac{\text{Equity Capital}}{Dh+Bfr+Lfr}$

k is the index to decline to increase the risk at the portfolio of commercial banks. The deposit is fixed at total 1 and borrowings have the constraint cannot be negative value beyond the minimum borrowings  $\beta$ . For example, if deposit=1, the minimum of required equity = 10%, borrowings = 0.3.

$$\frac{1+0.1}{0.3+0.1} = \frac{1.1}{0.4} = 2.75$$

If the minimum of required equity is raised from 10% to 15%, k index was as below:

$$\frac{1+0.15}{0.3+0.15} = \frac{1.15}{0.45} = 2.55$$

To increase the k index, the bank should increase the deposit beyond the initial deposit level (1 in this simulation) or allocate the borrowing portfolio.

## Conclusion

The minimum capital requirement is a necessary condition for banking sector stability to raise the quality, consistency and transparency of the capital base. However, it has friction with the portfolio management. By using effects of increasing the equity at the portfolio composition, reducing procyclicality (to the financial shocks) and promoting the countercyclical buffer are pursued.

In the Basel 3 system, the risk coverage framework intends to capture all material risks by using counterparty credit risk formula weighted on the external rating of the counterparty. Exposure measures contain on-balance sheet, repurchase agreements and securities finance, derivatives and off-balance sheet (OBS) items. In the paper, rather than enlarging the risk contagion, related factors and risk affection scope are detected without overstatement by using the general equilibrium (GE) model and deposit affection to the optimized equity capital. Deposits are in the large portion at the household, firm and banks. To explain risk coverage, by proving correlation of optimized equity capital upon the previous deposit level, the paper aims to ensure that banking-sector-capital requirements take account of the macro-financial environment in which each substantial economic entity operates.

Basel 3 introduced a minimum leverage ratio. The leverage ratio was calculated by dividing Tier1 capital by the bank's average total consolidated assets. In the paper, k index is suggested as the indicator of risk taking. Within the liability, three major fractions like deposits, borrowings and optimized equity capital are considered as the complementary of minimum capital requirement. Assets of commercial banks are mainly consisted with loans and securities. Because the optimized equity capital grows and deposits is restricted by change. Borrowings that are the difference between asset and deposit+equity capital should be checked whether borrowings cover the optimized equity by k index or not.

The combination of portfolio composition test, deposit-equity optimization and k index enables bounding the bank capital regulation problems.

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# ECONOMIC SIZE AND DEBT SUSTAINABILITY AGAINST PIKETTY'S "CAPITAL INEQUALITY"

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**Abstract.** *This article presents a methodology designed to facilitate alternative variables measuring economic growth. A capital-labor split of Cobb-Douglas function is adapted for use in the context of economic growth. A capital/income ratio and two fundamental laws of capitalism originated by Thomas Piketty illustrate capital inequality undervalued with respect to labor inequality. In addition, the article includes export and external debt as strong alternatives. Empirical data of the World Bank are analyzed to demonstrate broad differences in economic sizes. The case analysis on Latin America as an example of different sized economy is also discussed.*

**Keywords:** *capital-labor split, factors of production, capital/income ratio, Thomas Piketty, capitalism, economic size, debt sustainability, Latin America, import substitution industrialization (ISI) model, insolvent external debt, openness, external debt to exports ratio*

**JEL Classifications:** *E01; E22; G00; G01; H63*

## Introduction

### *Questions about stability of the capital-labor split*

“ .....in the 2000s several official reports published by the Organization for Economic Cooperation and Development (OECD) and the International Monetary Fund (IMF) took note of the phenomenon (a sign that the question was being taken seriously). The novelty of this study is that it is to my knowledge *the first attempt to place the question of the capital-labor split and the recent increase of capital's share of national income* in a broader historical context by focusing on the evolution of the capital/income ratio from the eighteenth century until now. .... ”

*Ref: Thomas Piketty (2014) Capital in the Twenty-First Century*

Until when, can we use the Cobb-Douglas function with the mindset to believe the stability of the Capital-Labor split? A rational answer with alternative solutions should be pursued to this question. At the first step, we may comment on weakness of this method.

Firstly, the Solow residual which is a number describing empirical productivity growth in an economy from year to year and decade to decade is hard to be calculated because of it's "residual" which is the part of growth that cannot be explained through capital accumulation or the accumulation of other traditional factors, such as land or labor.

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The equation in Cobb-Douglas form is:  $Y = A K^\alpha L^\beta$  where total output  $Y$  is as a function of total-factor productivity  $A$ , Capital input  $K$ , Labor input  $L$  and two input's respective shares of output. ( $\alpha$  and  $\beta$  are the capital input share of contribution for  $K$  and  $L$  respectively)

Even though Robert Solow defined rising productivity as rising output with constant capital and labor input perfectly, he left undefined part as the Solow residual. The problem is that Solow residual has pro-cyclicality. Traditionally, total output is measured by inputs of labor and capital. TFP (TFP) called multi-factor productivity (MFP) accounting for all inputs cannot be measured directly and accounts for effects in total output not caused by inputs. Indeed, there are two sided directions to analyze the economy.

Especially, Multifactor Productivity (MFP) is measured as below:

$$MFP_i = Y_i - \varphi_i \text{ where } Y_i \text{ denotes actual output and } \varphi_i \text{ denotes predicted output} \quad (1a)$$

$$\text{Log}_e(Y) = \alpha_0 + \beta_1 \log_e(K_i) + \gamma_1 \log_e(L_i) \quad (1b)$$

So we get,  $MFP = \Delta(\ln f)/\Delta t = \Delta(\ln Y)/\Delta t - s_L \times \Delta(\ln L)/\Delta t - s_K \times \Delta(\ln K)/\Delta t$  where  $f$  is the global production function:  $Y$  is output,  $t$  is time,  $s_L$  is the share of input costs attributable to labor expenses,  $s_K$  is the share of input costs attributable to capital expenses,  $L$  is a dollar quantity of labor,  $K$  is a dollar quantity of capital,  $M$  is a dollar quantity of materials,  $S$  is a dollar quantity of (business) services,  $E$  is energy or exergy (available energy), only used in some models.

Secondly, like Total Factor Productivity (TFP), Growth accounting exercises are open to the Cambridge Critique. The aggregation problem is the major part of this debate. The style that the representative agent solves the decision problem in the function assuming the entire economy cannot be from the debate about the collection problem of different inputs, sudden shocks, rate of profit and a large number of heterogeneous workplaces. Hence, some economists believe that the method and its results are invalid.

Otherwise, we can indirectly establish the model to find determinants of TFP. Neoclassical economics started with the classical factors of production of land, labor and capital. Further distinctions from classical and neoclassical microeconomics include capital-the result of investment, fixed capital, working capital, financial capital and technological progress. Additionally, entrepreneurship, human capital, intellectual capital, social capital, natural resources and energy can be considered.

Table 1: Methodology about Factors of Production

**Inputs:** Three Factors of Production

**Classical economics** Adam Smith, David Ricardo: Labor, Capital Stock, Land (Natural Resource)

**Marxism** Labor, The subject of labor, The instruments of labor

**Neoclassical microeconomics** different format: Capital, Fixed Capital, Working Capital, Financial Capital, Technological progress

**+add:** Entrepreneurs (Frank Knight), Human Capital, Intellectual Capital, Social Capital (Pierre Bourdieu), Natural resources (Ayres-Warr), Energy

**Output:** Finished Goods (National Income)

**Factor Payments:** Rent, Wage, Interest, Profit

*Ref: author, 2014*

So we need to think "Weightness" on Labor, Capital and other factors at the next step. I agree with the opinion of Thomas Piketty that structure of inequality with respect to both labor and capital has actually changed since the ninetieth century.

"To what extent are inequalities of income from labor moderate, reasonable, or even no longer an issue today? It is true that inequalities with respect to labor are always much smaller than inequalities with respect to capital. It would be quite wrong, however, to neglect them, first because income from labor generally accounts for two-thirds to three-quarters of national income, and second because there are quite substantial differences between countries in the distribution of income from labor, which suggests that public policies and national differences can have major consequences for these inequalities and for the living conditions of large numbers of people."

*Ref: Thomas Piketty (2014) Capital in the Twenty-First Century*

## **Dynamics of the capital/income ratio of Thomas Piketty: $r > g$**

"...If, moreover, the rate of return on capital remains significantly above the growth rate for an extended period of time (which is more likely when the growth rate is low, though not automatic), then the risk of divergence in the distribution of wealth is very high..."

"...This fundamental inequality, which I will write as  $r > g$  (where  $r$  stands for the average annual rate of return on capital, including profits, dividends, interest, rents, and other income from capital, expressed as a percentage of its total value, and  $g$  stands for the rate of growth of the economy, that is, the annual increase in income or output), will play a crucial role in this book. In a sense, it sums up the overall logic of my conclusions...."

*Ref: Thomas Piketty (2014) Capital in the Twenty-First Century*

Thomas Piketty put emphasis on capital inequality. This is the similar viewpoint of boom and burst. Boom and burst are periods of a severe business cycle over time. Several economic indicators are denoted as sustained increases followed by a sharp and rapid contraction. Times of increased business and investment have collapsed leaving widespread poverty such as the depression of 1837 and 1857 in the United States. For example, in the early 1800s in Ohio people were buying land on credit to sell at twice the price but land became too expensive to buy. At the same time, wheat prices became too low to transport wheat to market. Wheat was \$1.50 per bushel in 1816 ; by 1821, 20 cents. The automaker Paul Hoffman said "we can not live with a crash with 26 depressions over 100 years including the burst of the 1930s. "

The dynamics of the capital/income ratio adds a new perspective to the debate on capital and wealth. Previous study provides an overview of economic development. The direction of economic growth rate should increase to the top. However, the new viewpoint offers an alternative framework to demonstrate how the society actually move. It examines different meanings of changes and directions with regard of economic growth. The attempt to be escaped by the required bilateral choice between capital and labor reilluminates on alternative factors to research economic growth.

*The First Fundamental Law of Capitalism  $\alpha = r \times \beta$*

With the aid of exploration of capital induced from national income, the first law of capitalism attempts to show visible motion of dynamics. It requires the fully-fledged account of global data because the formula produces the global interpretation without constraints. In the left side of formula,  $\alpha$  can be added and in the right side of formula,  $r \times \beta$  can be added. Hence, broader context with global empirical data is somewhat limited.

"In order to illustrate the difference between short-term and long-term movements of the capital/income ratio, it is useful to examine the annual changes observed in the wealthiest countries between 1970 and 2010, a period for which we have reliable and homogeneous data for a large number of countries. To begin, here is a look at the ratio of private capital to national income, whose evolution is shown in Figure 5.3 for the eight richest countries in the world, in order of decreasing GDP: the United States, Japan, Germany, France, Britain, Italy, Canada, and Australia." "Figure 5.3 (figure 1 in the paper as below) displays annual series and shows that the capital/income ratio in all countries *varied constantly in the very short run.*"

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".... can now present the first fundamental law of capitalism, which links the capital stock to the flow of income from capital. The capital/income ratio  $\beta$  is related in a simple way to the share of income from capital in national income, denoted  $\alpha$ . The formula is  $\alpha = r \times \beta$ , where  $r$  is the rate of return on capital. ..."

Ref: Thomas Piketty (2014) *Capital in the Twenty-First Century*

The first law of capitalism offers a subjective view of capital to focus on evasion of bilateral choice between capital and labor. Further evidence of the authenticity of the texts is needed.

In the figure 1 (as below), the slope is upward in the end. It implies interpretation about long-run or short-run economy is possible. However, depending on the date of the World Bank as below, it's impossible to explain about capital formation except for data of China. China has the highest gross capital formation (% of gross domestic production (GDP)) from 2004 to 2013. Indeed, this level is higher than the world's one. France, Germany, United States and Japan's graphs are similar except for China's one.

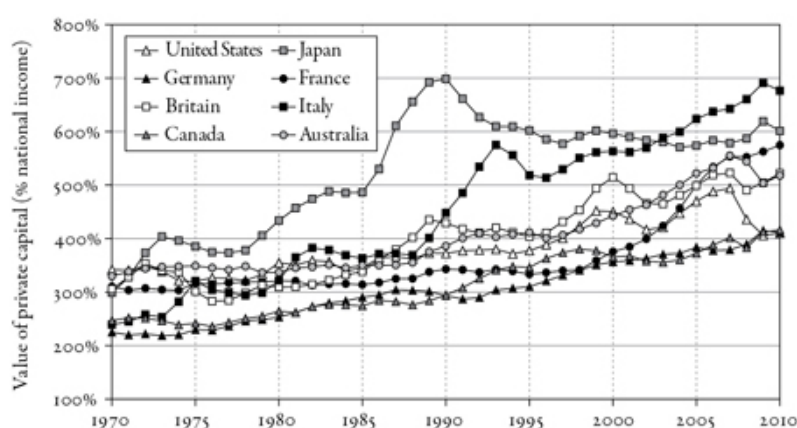


FIGURE 5.3. Private capital in rich countries, 1970–2010

Figure 1 : Private Capital in Rich Countries, 1970-2010

Ref: [piketty.pse.ens.fr/capital21c](http://piketty.pse.ens.fr/capital21c)

In the figure 2 (as below), gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.

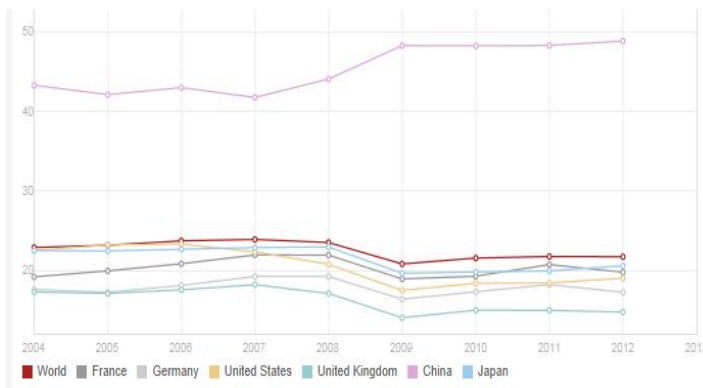


Figure 2 : Gross Capital Formation (% of gross domestic production (GDP))

*Ref : World Bank national accounts data and OECD National Accounts data files, May, 2014*

The first law of capitalism gives fresh impetus to emphasize the role of capital to promote economic growth. It should be elaborated to describe the main features of dynamics related to global data for the possibility of wide cross-country comparison.

*The Second Fundamental Law of Capitalism:  $\beta = s / g$*

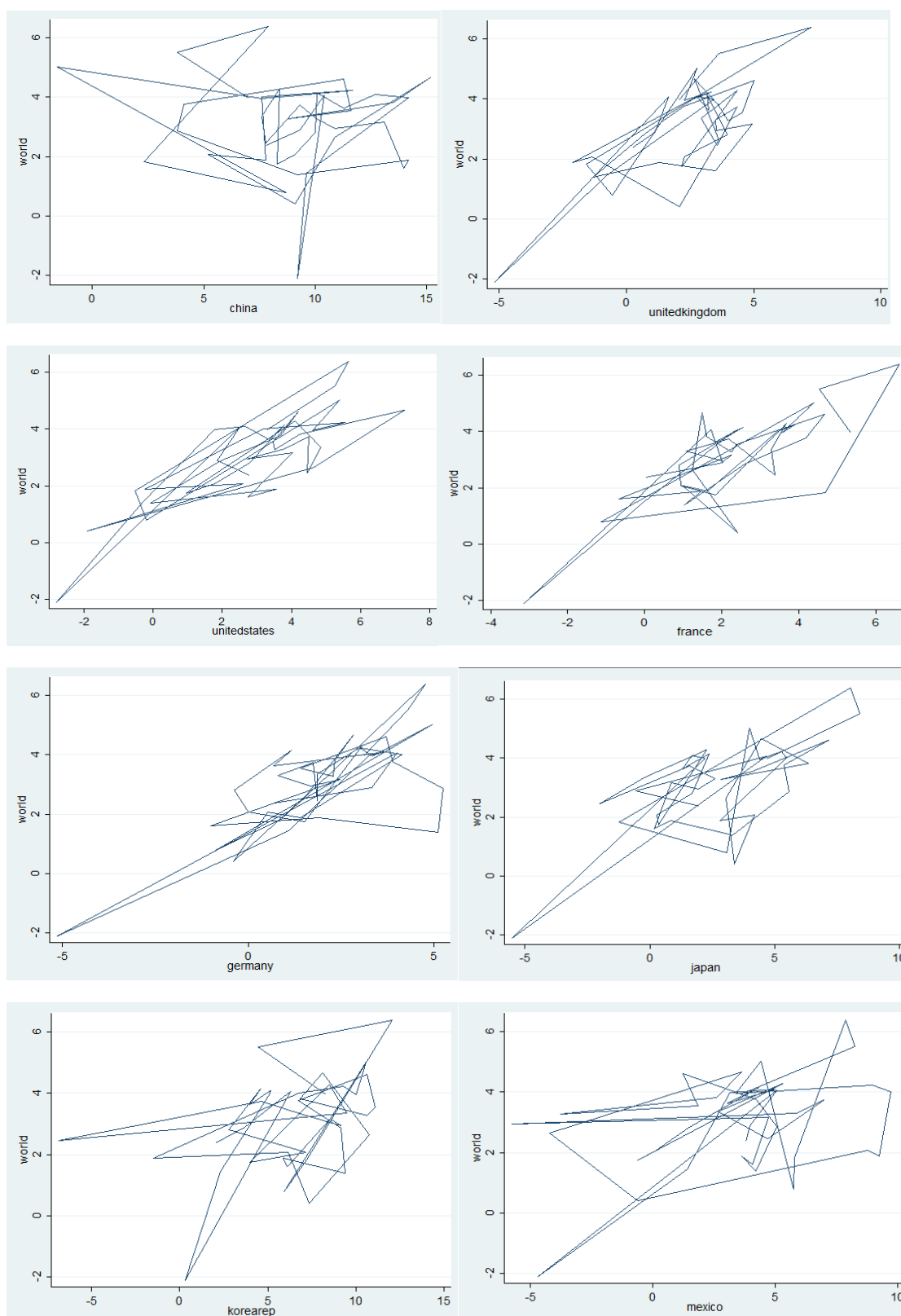
“....In the long run, the capital/income ratio  $\beta$  is related in a simple and transparent way to the savings rate  $s$  and the growth rate  $g$  according to the following formula:  $\beta = s / g$ ....”

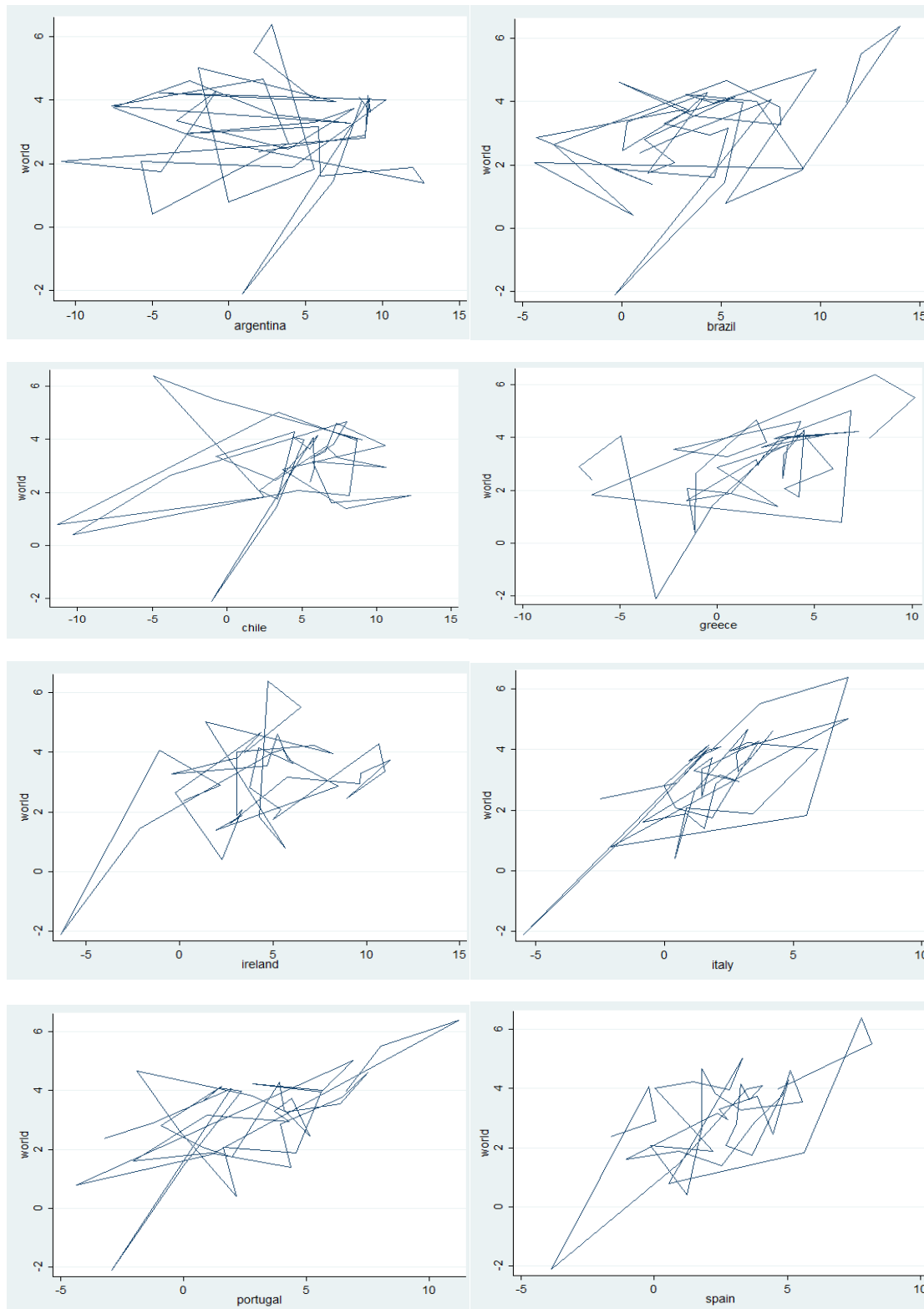
*Ref: Thomas Piketty (2014) Capital in the Twenty-First Century.*

Gauging the general applicability related to the income rate to the growth rate is investigated by similarity between each gross domestic production (GDP) motion of different countries and world average motion.

As below, there are graphs of correlation between countries' gross domestic production (GDP) growths and the world's one. China has very different shapes of correlation with respect to the world's one from other's. This example is to test the hypothese of the second law of capitalism. With the panoramic viewpoint of figure 3, the argument is evidently to make explicit cross-sectional data of different countries and thus contrast various interpretations upon which to different approaches to the contemporary management of past built environments are based.

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*Ref: author, 2014*

Figure 3 : Graphs of Correlation between Countries' gross domestic production (GDP) Growths and the World's One

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Gross domestic production (GDP) growth graphs of United Kingdom, United States, France, Germany, Japan, Ireland, Italy, Portugal and Spain have similar upward tendencies. China's one looks like South Korea, Mexico, Argentina, Brazil and Chile.

In addition, in the long run, can the capital/income ratio  $\beta$  be reflected by the volatility of the savings rate  $s$  and the growth rate  $g$ ? Within the context not to divide into countries depending on their economic sizes, then, we face aggregation problem. This brief empirical test here is intended to provoke the case that outstanding values than averaged value in the long run can exist. The second law of capitalism encapsulates the capital concern in general. However, it initiates a discussion of the stabilization of dynamics and boundary of optimal values by the end. Hence, in this paper, I will endeavor to explore new variables which can affect the left side and right side in the law of capitalism by absorption.

### **Economic Size and Debt Sustainability**

#### *Trade condition*

Judging from stability of the capital-labor split, in the paper, attention was directed to the weightiness of capital and labor. Two laws of Piketty's capitalism have centered on the capital inequality within national income. The main objective of arguments is to investigate the validity of global application because an idea of capital inequality takes economic growth as focal point. In what follows, I explore key signifying variables. I hope to look most closely at familiar economic variables from a global angle.

I shall start by an attempt to check the correlation between average value of world and each value of each country with regard to exports of goods and services, gross domestic production (GDP) growth, GDP per capital, gross national income (GNI) per capital purchasing power parity (PPP), Gross capital formation, Gross savings, foreign direct investment (FDI) and inflation consumer price. What I propose to do here is to examine structural importance of key economic variables except for capital within world variables. I will use these empirical data as a framework against which to understand the capital within national income. I will concentrate on more rational way to address economic growth and capital inequality offering the global interpretation beyond the capital inequality framework within national income of Thomas Piketty.

Depend on data of World Bank, from 1970 to 2013, the correlation between world's one and countries' exports of goods and services is positive. (Observation 43)

Table 3.1 : Correlation between World's One and Countries' Exports of Goods and Services

```
. tasset year, yearly
      time variable: year, 1970 to 2013
      delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=43)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.9405	1.0000															
unitedking-m	0.5924	0.3751	1.0000														
unitedstates	0.8832	0.7900	0.6468	1.0000													
france	0.8993	0.8258	0.5620	0.7695	1.0000												
germany	0.9683	0.8941	0.5465	0.8095	0.8096	1.0000											
japan	0.5181	0.3912	0.5296	0.3523	0.3885	0.5935	1.0000										
korearep	0.8449	0.6952	0.6351	0.7774	0.7363	0.8560	0.5582	1.0000									
mexico	0.9091	0.8664	0.4934	0.7960	0.8577	0.8733	0.3104	0.8049	1.0000								
argentina	0.8342	0.8387	0.3617	0.5639	0.6925	0.8749	0.5447	0.6645	0.7441	1.0000							
brazil	0.6918	0.7306	0.2065	0.3751	0.6576	0.7104	0.5045	0.5445	0.5740	0.7780	1.0000						
chile	0.8302	0.8606	0.3809	0.7245	0.7212	0.8176	0.3636	0.7013	0.8035	0.7478	0.6735	1.0000					
greece	0.7510	0.6470	0.5549	0.6935	0.8143	0.6839	0.4917	0.7873	0.6688	0.5067	0.6020	0.6394	1.0000				
ireland	0.9146	0.8468	0.5172	0.8310	0.8989	0.8567	0.1944	0.7590	0.9173	0.7070	0.5607	0.7418	0.6628	1.0000			
italy	0.9031	0.7886	0.7651	0.8251	0.8875	0.8302	0.5112	0.7585	0.8035	0.6994	0.5183	0.6392	0.7364	0.8447	1.0000		
portugal	0.7728	0.7389	0.3284	0.6727	0.7230	0.7756	0.2717	0.6924	0.8569	0.5946	0.6060	0.7372	0.6005	0.7685	0.5978	1.0000	
spain	0.9122	0.8396	0.5292	0.7607	0.9290	0.8601	0.3238	0.7707	0.9310	0.7223	0.6315	0.6871	0.7032	0.9541	0.8702	0.8164	1.0000

From 1971 to 2012, among the correlation between world's one and countries' GDP growth, China and Argentine's ones have negative values. (Observation 42)

# ECONOMIC SIZE AND DEBT SUSTAINABILITY AGAINST PIKETTY’S “CAPITAL INEQUALITY”

Table 3.2 : Correlation between World’s One and Countries’ GDP Growth

```
. tsset year, yearly
      time variable: year, 1971 to 2012
             delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=42)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	-0.0539	1.0000															
unitedking-m	0.7440	0.2611	1.0000														
unitedstates	0.8277	0.0932	0.7400	1.0000													
france	0.7557	-0.3750	0.5449	0.5192	1.0000												
germany	0.7516	-0.2165	0.4128	0.5139	0.7187	1.0000											
japan	0.6904	-0.1311	0.4414	0.4927	0.5575	0.6547	1.0000										
korearep	0.4124	-0.0192	0.4016	0.3494	0.3844	0.4110	0.5317	1.0000									
mexico	0.3986	-0.2336	0.0250	0.2509	0.3576	0.4041	0.3846	-0.1103	1.0000								
argentina	0.0538	0.2677	-0.0126	-0.0275	-0.0778	0.1137	-0.1849	-0.1720	0.1524	1.0000							
brazil	0.4848	-0.1495	0.2327	0.1806	0.4440	0.3089	0.3272	0.1246	0.2979	0.1858	1.0000						
chile	0.2680	0.2042	0.0775	0.3134	0.1194	0.3131	0.0613	-0.0036	0.1311	0.2586	0.0275	1.0000					
greece	0.5008	-0.0818	0.4651	0.4337	0.4427	0.3425	0.4424	0.1664	0.2375	-0.1414	0.3403	-0.0647	1.0000				
ireland	0.4282	-0.0331	0.4954	0.4508	0.4436	0.2994	0.1960	0.1388	0.3208	-0.1863	-0.0524	0.1375	0.4483	1.0000			
italy	0.7481	-0.3120	0.5058	0.5200	0.8464	0.7342	0.5977	0.4675	0.3781	-0.0511	0.5117	0.2184	0.3769	0.3500	1.0000		
portugal	0.6214	-0.3770	0.4655	0.4043	0.8098	0.6472	0.5895	0.3449	0.2592	-0.1020	0.3890	0.1805	0.4951	0.3735	0.7559	1.0000	
spain	0.6357	-0.2734	0.5678	0.4214	0.7821	0.5245	0.4195	0.2819	0.1823	-0.0890	0.3775	-0.0294	0.5579	0.5725	0.6648	0.7244	1.0000

From 1970 to 2013, the correlation between world’s one and countries’ GDP per capital is positive. (Observation 43)

Table 3.3 : Correlation between World’s One and Countries’ GDP per Capital

```
. tsset year, yearly
      time variable: year, 1970 to 2013
             delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=43)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.8802	1.0000															
unitedking-m	0.9665	0.7830	1.0000														
unitedstates	0.9783	0.7991	0.9830	1.0000													
france	0.9878	0.8176	0.9752	0.9718	1.0000												
germany	0.9832	0.8027	0.9629	0.9664	0.9985	1.0000											
japan	0.9111	0.6655	0.8813	0.9238	0.9197	0.9453	1.0000										
korearep	0.9814	0.8536	0.9745	0.9721	0.9725	0.9691	0.8947	1.0000									
mexico	0.9587	0.8236	0.9650	0.9691	0.9432	0.9348	0.8684	0.9639	1.0000								
argentina	0.8366	0.7221	0.7442	0.7959	0.8117	0.8478	0.8779	0.7926	0.7783	1.0000							
brazil	0.9299	0.9482	0.8302	0.8489	0.8902	0.8885	0.7844	0.8947	0.8475	0.8435	1.0000						
chile	0.9519	0.9623	0.8924	0.8941	0.9124	0.9046	0.7859	0.9441	0.9147	0.8079	0.9706	1.0000					
greece	0.9684	0.8484	0.9704	0.9501	0.9772	0.9586	0.8318	0.9654	0.9423	0.7311	0.8854	0.9263	1.0000				
ireland	0.9477	0.8176	0.9840	0.9569	0.9527	0.9307	0.8091	0.9651	0.9538	0.6762	0.8289	0.9036	0.9826	1.0000			
italy	0.9791	0.7904	0.9800	0.9754	0.9942	0.9884	0.9203	0.9661	0.9381	0.7950	0.8596	0.8883	0.9689	0.9526	1.0000		
portugal	0.9799	0.8338	0.9836	0.9736	0.9871	0.9794	0.8902	0.9820	0.9612	0.7866	0.8810	0.9250	0.9882	0.9791	0.9841	1.0000	
spain	0.9794	0.8356	0.9816	0.9649	0.9902	0.9769	0.8715	0.9751	0.9497	0.7596	0.8801	0.9204	0.9933	0.9783	0.9884	0.9942	1.0000

From 1980 to 2012, the correlation between world’s one and countries’ GNI per capital ppp is positive. (Observation 27)

Table 3.4 : Correlation between World's One and Countries' GNI per Capital PPP

```
. tsset year, yearly
      time variable: year, 1980 to 2012
      delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=27)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.9804	1.0000															
unitedking-m	0.9965	0.9802	1.0000														
unitedstates	0.9976	0.9706	0.9973	1.0000													
france	0.9945	0.9628	0.9949	0.9977	1.0000												
germany	0.9934	0.9553	0.9850	0.9921	0.9919	1.0000											
japan	0.9777	0.9202	0.9697	0.9809	0.9833	0.9937	1.0000										
korearep	0.9947	0.9756	0.9967	0.9947	0.9949	0.9878	0.9753	1.0000									
mexico	0.9798	0.9549	0.9780	0.9816	0.9822	0.9788	0.9696	0.9821	1.0000								
argentina	0.9304	0.9110	0.9191	0.9294	0.9199	0.9341	0.9232	0.9221	0.9547	1.0000							
brazil	0.9879	0.9533	0.9821	0.9872	0.9822	0.9884	0.9829	0.9813	0.9674	0.9288	1.0000						
chile	0.9880	0.9718	0.9893	0.9889	0.9882	0.9811	0.9684	0.9919	0.9882	0.9519	0.9765	1.0000					
greece	0.9921	0.9879	0.9932	0.9868	0.9856	0.9780	0.9549	0.9914	0.9653	0.8959	0.9691	0.9792	1.0000				
ireland	0.9891	0.9917	0.9934	0.9868	0.9837	0.9695	0.9441	0.9901	0.9719	0.9159	0.9632	0.9876	0.9936	1.0000			
italy	0.9857	0.9389	0.9854	0.9927	0.9957	0.9905	0.9905	0.9862	0.9781	0.9233	0.9821	0.9826	0.9687	0.9669	1.0000		
portugal	0.9926	0.9582	0.9910	0.9952	0.9977	0.9940	0.9876	0.9934	0.9829	0.9267	0.9831	0.9893	0.9819	0.9799	0.9950	1.0000	
spain	0.9977	0.9812	0.9975	0.9964	0.9960	0.9887	0.9716	0.9960	0.9780	0.9174	0.9802	0.9888	0.9955	0.9935	0.9853	0.9939	1.0000

From 1970 to 2013, the correlation between world's one and countries' gross capital formation is positive. (Observation 27)

Table 3.5 : Correlation between World's One and Countries' Gross Capital Formation

```
. tsset year, yearly
      time variable: year, 1970 to 2013
      delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=43)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	-0.7490	1.0000															
unitedking-m	0.8368	-0.7364	1.0000														
unitedstates	0.6107	-0.4891	0.5601	1.0000													
france	0.7413	-0.6458	0.6634	0.1572	1.0000												
germany	0.7950	-0.7988	0.6305	0.3276	0.6390	1.0000											
japan	0.8684	-0.8217	0.7339	0.3414	0.6454	0.9278	1.0000										
korearep	0.0089	0.2667	-0.1280	-0.0514	-0.4036	-0.0719	0.0471	1.0000									
mexico	0.3386	-0.0991	0.0996	0.0799	0.4694	0.0573	0.0931	-0.0722	1.0000								
argentina	0.4279	-0.2998	0.2619	0.1080	0.5608	0.2872	0.2526	-0.3632	0.3944	1.0000							
brazil	0.6688	-0.4427	0.5867	0.0796	0.6187	0.5013	0.6397	0.0308	0.3862	0.4524	1.0000						
chile	-0.2654	0.5253	-0.2972	-0.2606	-0.4089	-0.3245	-0.2886	0.5596	-0.0382	-0.3342	-0.0913	1.0000					
greece	0.7294	-0.8255	0.7530	0.4301	0.7564	0.7155	0.7277	-0.3766	0.1089	0.3666	0.4209	-0.6208	1.0000				
ireland	0.5633	-0.5411	0.4452	0.6798	0.4442	0.3062	0.3093	-0.1758	0.3913	0.3421	0.0675	-0.3075	0.5907	1.0000			
italy	0.8497	-0.7640	0.7371	0.4513	0.8242	0.6342	0.7294	-0.2096	0.4446	0.4607	0.6053	-0.4686	0.7783	0.5742	1.0000		
portugal	0.6303	-0.6201	0.4865	0.5959	0.3832	0.5241	0.5521	-0.0254	0.3391	0.0794	0.3343	-0.2453	0.4181	0.6055	0.5617	1.0000	
spain	0.2551	-0.2653	0.3867	0.0558	0.5390	0.0348	0.0966	-0.2535	0.3103	0.1790	0.1415	-0.0400	0.4746	0.5319	0.3792	0.0630	1.0000

From 1970 to 2012, the correlation between world's one and countries' gross savings have negative value. (Observation 14)

Table 3.6 : Correlation between World's One and Countries' Gross Savings

# ECONOMIC SIZE AND DEBT SUSTAINABILITY AGAINST PIKETTY’S “CAPITAL INEQUALITY”

```
. tsset year, yearly
      time variable: year, 1970 to 2012
            delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=14)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	-0.2623	1.0000															
unitedking-m	0.5978	-0.6705	1.0000														
unitedstates	0.6245	-0.5471	0.8384	1.0000													
france	0.3293	0.3047	-0.4119	-0.2846	1.0000												
germany	0.0327	0.3357	-0.6349	-0.6434	0.8394	1.0000											
japan	0.0053	-0.0902	-0.4779	-0.4503	0.6833	0.8386	1.0000										
korearep	-0.0103	0.5675	-0.6589	-0.6957	0.6475	0.8496	0.5909	1.0000									
mexico	0.4434	-0.7125	0.8185	0.7329	-0.3262	-0.5132	-0.3047	-0.6254	1.0000								
argentina	0.0216	-0.2550	0.5578	0.5394	-0.7014	-0.8123	-0.7340	-0.8338	0.5956	1.0000							
brazil	0.2854	-0.1802	-0.0678	-0.2503	0.3986	0.4801	0.6384	0.4319	-0.1687	-0.5585	1.0000						
chile	0.0239	0.7177	-0.6932	-0.6634	0.7548	0.8158	0.4768	0.9299	-0.6582	-0.7590	0.3675	1.0000					
greece	-0.2550	-0.6022	0.3648	0.3794	-0.4924	-0.4791	-0.1070	-0.7051	0.2518	0.3675	-0.2303	-0.8011	1.0000				
ireland	0.1448	0.7883	-0.3557	-0.1048	0.4875	0.2571	-0.1589	0.3720	-0.3109	-0.1412	-0.3196	0.6046	-0.6400	1.0000			
italy	0.5424	-0.4032	0.8387	0.7907	-0.3890	-0.6317	-0.6667	-0.5787	0.7317	0.6097	-0.4267	-0.5511	0.1458	0.0062	1.0000		
portugal	0.2773	-0.3135	-0.0746	-0.2274	0.5229	0.5497	0.7193	0.4131	0.0486	-0.4789	0.6404	0.3098	-0.1960	-0.2961	-0.2571	1.0000	
spain	0.6429	-0.0380	0.0719	0.0580	0.6123	0.5567	0.4178	0.5557	0.0133	-0.5539	0.3143	0.4755	-0.4234	0.2226	0.1958	0.5306	1.0000

From 1961 to 2013, the correlation between world’s one and countries’ inflation consumer prices have negative value. (Observation 3)

Table 3.8 : Correlation between World’s One and Countries’ Inflation Consumer Prices

```
. tsset year
      time variable: year, 1961 to 2013
            delta: 1 unit

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=3)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.9475	1.0000															
unitedking-m	0.9333	0.9991	1.0000														
unitedstates	0.9830	0.8727	0.8515	1.0000													
france	0.7750	0.5323	0.4964	0.8779	1.0000												
germany	0.6277	0.3458	0.3062	0.7599	0.9784	1.0000											
japan	0.2465	-0.0763	-0.1179	0.4203	0.8035	0.9092	1.0000										
korearep	0.8640	0.9796	0.9872	0.7568	0.3514	0.1503	-0.2750	1.0000									
mexico	-0.9992	-0.9592	-0.9465	-0.9751	-0.7499	-0.5970	-0.2088	-0.8828	1.0000								
argentina	-0.8721	-0.6699	-0.6382	-0.9471	-0.9851	-0.9283	-0.6892	-0.5071	0.8525	1.0000							
brazil	0.9921	0.9001	0.8811	0.9982	0.8480	0.7201	0.3658	0.7942	-0.9866	-0.9264	1.0000						
chile	0.7029	0.4387	0.4007	0.8216	0.9943	0.9949	0.8626	0.2492	-0.6749	-0.9611	0.7864	1.0000					
greece	-0.0136	0.3068	0.3464	-0.1969	-0.6424	-0.7869	-0.9724	0.4918	-0.0252	0.5011	-0.1385	-0.7207	1.0000				
ireland	0.7585	0.5104	0.4740	0.8653	0.9997	0.9834	0.8185	0.3273	-0.7327	-0.9804	0.8341	0.9967	-0.6618	1.0000			
italy	0.4143	0.1016	0.0598	0.5744	0.8963	0.9686	0.9842	-0.1003	-0.3787	-0.8067	0.5249	0.9386	-0.9157	0.9073	1.0000		
portugal	0.8496	0.6365	0.6036	0.9320	0.9917	0.9438	0.7205	0.4685	-0.8286	-0.9990	0.9089	0.9723	-0.5388	0.9881	0.8320	1.0000	
spain	0.9260	0.7567	0.7287	0.9796	0.9562	0.8751	0.5942	0.6100	-0.9107	-0.9923	0.9659	0.9194	-0.3900	0.9484	0.7272	0.9859	1.0000

From 1970 to 2012, the correlation between world’s one and countries’ FDI is no observation.

Table 3.7 : Correlation between World's One and Countries' FDI – no observation

```
. tasset year
      time variable: year, 1970 to 2012
      delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
no observations
r(2000);
```

Among the correlation with the world's one, exports of goods and services, GDP per capital and gross capital formation have positive correlation value. This is the reason why we need to focus on trade condition beyond no trade condition and complete market condition. The attempt to identify the law of capitalism by Thomas Piketty draws together the bulk of the published neoclassical papers mainstreamed by French Economists. I wish to flesh this out to take a highly microscopic approach to the question of economic growth. I begin with a case analysis of Latin America animated by a curiosity about impact of export and debt problematizing sovereign credit to affect the sustainability of each country and the whole economy in general.

To deal with the global framework of capital inequality and economic growth, I turn to state export and debt sustainability in a series of ratio analysis of Thomas Piketty. I may say that capital inequality within national income will be articulated with ideas about external debt to export. Having discussed empirical data, it is now time to focus on global activities beyond the domestic activities concerning sustainability of economic society.

### *Export and Debt sustainability*

In case of debt sustainability, the debt to export criterion should be considered with the size of countries. (Roubini, N. 2001) Suppose you have two countries, A and B that are identical. Their GDP is 100 each, their external debt is 50 each and their exports are 20 each. Then the debt to GDP ratio is 50% for each and the debt to export ratio is 250% each. Assume that, at this ratio, both countries are solvent. Now take the two countries and merge them. Total GDP will be 200, total debt will be 100 and total exports will be 20. Roubini, N. (2001) mentioned this is because exports among each other are now inter-regional rather than international trade. Hence, economic problems with no trade cannot be solved in reality.

By the end of this case, the combined A+B economy has a debt to GDP ratio that is still 50% but now the debt to export ratio is 500%, a figure that is clearly unsustainable and would suggest default.

Indeed, using the debt to export criterion, same two economies look solvent if they are a separate country and insolvent if they are joined in one country. This suggests that the debt to export ratio may be a faulty measure of solvency; larger countries with greater intra-regional, rather than international trade, would look insolvent while smaller countries with similar fundamental would look solvent just because their export to GDP ratio is higher.

However, in the example, the export to GDP ratio is lower for a larger country with greater amount of inter-regional, rather than international trade. But a small open economy, like Argentina, is usually more open than a larger economy; thus, low export to GDP ratio may reflect currency overvaluation, high degrees of trade protection and other policy restrictions to openness rather than structural factors that explain lower openness. Thus, an economy that should be more open than it is and has a large debt to export ratio may find it harder to service its external debt. For example, if export ratios are low, even a large real depreciation may not improve exports and trade balance enough to reduce a resource (trade balance) gap necessary to prevent insolvency. So, the degree of openness (export to GDP ratio) within countries or beyond countries does affect country's ability to service its debt.

As below, through the dickey fuller test - examines a unit root is present in an autogressive model, validity of variables can be detected more. These data arranged yearly from 1970 to 2012 can be distinguished whether it has a unit root, a feature of processes that evolve through time that can cause problems in statistical inference.

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Table 4 : Validity of Detectable Variables Checked by the Dickey Fuller Test

dickey fuller test	p-value	Mexicogniperc	0.298
Worldinfconuserp	0.3432	Argentagniperc	0.3281
Chinainfconuserp	0.0997	Brazilgniperc	0.3169
United Kingdominfconuserp	0.0351	Chilegniperc	0.267
United Statesinfconuserp	0.0279	Greecegniperc	0.0641
Franceinfconuserp	0.046	Irelandgniperc	0.2209
Germanyinfconuserp	0.0676	Italygniperc	0.0459
Japaninfconuserp	0.241	Portugalgniperc	0.5748
Korea, Rep.infconuserp	0.0657	Spaingniperc	0.115
Mexicoinfconuserp	0.0459	Worldgdpperc	0.5265
Argentaininfconuserp	0.0061	Chinagdpperc	0.1349
Brazilinfconuserp	0.1299	United Kingdomgdpperc	0.0888
Chileinfconuserp	0.4592	United Statesgdpperc	0.0062
Greeceinfconuserp	0.5022	Francegdpperc	0.3853
Irelandinfconuserp	0.3117	Germanygdpperc	0.5728
Italyinfconuserp	0	Japangdpperc	0.1964
Portugalinfconuserp	0.3045	Korea, Rep.gdpperc	0.0356
Spaininfconuserp	0.2629	Mexicogdpperc	0.298
Worldgsaving	0.4606	Argentagdpperc	0.2843
Chinagsaving	0.7955	Brazilgdpperc	0.3086
United Kingdomgsaving	0.2142	Chilegdpperc	0.267
United Statesgsaving	0.0053	Greecedgpperc	0.0641
Francegsaving	0.099	Irelandgdpperc	0.2209
Germanygsaving	0.2228	Italygdpperc	0.0459
Japangsaving	0.4214	Portugalgdpperc	0.0484
Korea, Rep.gsaving	0.1076	Spaingdpperc	0.0193
Mexicogsaving	0.014	Worldgdpg	0.0031
Argentinasaving	0.0041	Chinagdpg	0
Brazilgsaving	0.0093	United Kingdomgdpg	0.0023
Chilegsaving	0.0009	United Statesgdpg	0.0104

dickey fuller test	p-value	Mexicogniperc	0.298
Greecegsaving	0.0184	Francegdpg	0.0234
Irelandgsaving	0.0006	Germanygdpg	0.227
Italygsaving	0	Japangdpg	0.0099
Portugalgsaving	0.0619	Korea, Rep.gdpg	0.0125
Spaingsaving	0	Mexicogdpg	0.0041
Worldgcf	0	Argentinagdpg	0
Chinagcf	0.6332	Brazilgdpg	0.017
United Kingdomgcf	0.0827	Chilegdpg	0.1073
United Statesgcf	0.0176	Greecegdpg	0
Francegcf	0.0507	Irelandgdpg	0.0034
Germanygcf	0.0006	Italygdpg	0.1602
Japangcf	0.0001	Portugalgdpg	0.2253
Korea, Rep.gcf	0.0004	Spaingdpg	0
Mexicogcf	0.0058	Worldexp	0.0245
Argentinagcf	0	Chinaexp	0.162
Brazilgcf	0.0089	United Kingdomexp	0.0108
Chilegcf	0.1748	United Statesexp	0.0038
Greecegcf	0.2375	Franceexp	0.1233
Irelandgcf	0.0319	Germanyexp	0.0557
Italygcf	0.0095	Japanexp	0
Portugalgcf	0.1592	Korea, Rep.exp	0.0023
Spaingcf	0.332	Mexicoexp	0.081
Worldgniperc	0.7192	Argentinaexp	0.0479
Chinagniperc	0.768	Brazilexp	0.073
United Kingdomgniperc	0.3285	Chileexp	0.3792
United Statesgniperc	0.0176	Greeceexp	0.6203
Francegniperc	0.3853	Irelandexp	0.5382
Germanygniperc	0.3763	Italyexp	0.5295
Japangniperc	0.1964	Portugalexp	0.4947
Korea, Rep.gniperc	0.0049	Spainexp	no obs

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*Ref : author made by the Dickey fuller test of countries' variables extracted from the World Bank, 2014*

infconsumerp= inflation consumer prices, gsaving=gross savings, gcf=gross capital formation, gniperc=gni per capital ppp, gdpperc=gdp per capita, gdpg=gdp growth, exp=exports of goods and services

A clear understanding of empirical data about economic data requires reliability of raw data. In supporting the assumption that export and debt sustainability is the key to get to the heart of questions relating to the economic growth, I mentioned with the empirical angle because it provides the necessary background for discussing capital to GDP and further GDP analysis related to capital inequality.

### **Debt management of Latin America**

#### *Debt-driven capital*

In the 1960s and 1970s many Latin American countries, notably Brazil, Argentina, and Mexico, borrowed huge sums of money from international creditors for industrialization; especially infrastructure programs. After 1973, private banks had an influx of funds from oil-rich countries and believed that sovereign debt was a safe investment. Between 1975 and 1982, Latin American debt to commercial banks increased at a cumulative annual rate of 20.4 percent. This heightened borrowing led Latin America to quadruple its external debt from \$75 billion in 1975 to more than \$315 billion in 1983, or 50 percent of the region's gross domestic product (GDP). Debt service (interest payments and the repayment of principal) grew even faster, reaching \$66 billion in 1982, up from \$12 billion in 1975.

#### *Failure of debt-driven capital*

As interest rates increased in the United States of America and in Europe in 1979, debt payments also increased, making it harder for borrowing countries to pay back their debts. Deterioration in the exchange rate with the US dollar meant that Latin American governments ended up owing tremendous quantities of their national currencies, as well as losing purchasing power. The contraction of world trade in 1981 caused the prices of primary resources (Latin America's largest export) to fall.

Argentina has until midnight on July 30, 2014 to avoid going into default for the eight time in its history. Most creditors exchanged their defaulted debt for new securities in two restructurings in 2005 and 2010 but a few creditors led by a hedge fund called NML Capital scooped up the cheap defaulted debt in order to chase payment of full principal plus interest. If argentina defaults, its outstanding debt under foreign law amounts will be \$29 billion.

*Why capital can not be simply explained within gross domestic production (GDP) : Attention to GDP replacing foreign imports – Import substitution industrialization (ISI)*

Import substitution industrialization (ISI) is a trade and economic policy that advocates replacing foreign imports with domestic production. ISI policies were enacted by countries within the Global South with the intention of producing development and self-sufficiency through the creation of an internal market. ISI works by having the state lead economic development through nationalization, subsidization of vital industries (including agriculture,

power generation, etc.), increased taxation, and highly protectionist trade policies. Import substitution industrialization was gradually abandoned by developing countries in the 1980s and 1990s due to structural indebtedness from ISI related policies on the insistence of the IMF and World Bank through their structural adjustment programs of market-driven liberalization aimed at the Global South.

ISI was most successful in countries with large populations and income levels which allowed for the consumption of locally produced products. Latin American countries such as Argentina, Brazil, Mexico, and (to a lesser extent) Chile, Uruguay and Venezuela, had the most success with ISI. This is so because while the investment to produce cheap consumer products may pay off in a small consumer market, the same cannot be said for capital intensive industries, such as automobiles and heavy machinery, which depend on larger consumer markets to survive. Thus, smaller and poorer countries, such as Ecuador, Honduras, and the Dominican Republic, could implement ISI only to a limited extent. Peru implemented ISI in 1961, and the policy lasted through to the end of the decade in some form.

By the early 1960s, domestic industry supplied 95% of Mexico's and 98% of Brazil's consumer goods. Between 1950 and 1980, Latin America's industrial output went up six times, keeping well ahead of population growth. Infant mortality fell from 107 per 1,000 live births in 1960 to 69 per 1,000 in 1980 and life expectancy rose from 52 to 64 years. In the mid 1950s, Latin America's economies were growing faster than those of the industrialized West.

*More to the immediate point why the GDP is not just the GDP to consider the capital inequality: example of Export-oriented industrialization (EOI)*

Export-oriented industrialization (EOI) sometimes called export substitution industrialization (ESI), export led industrialization (ELI) or export-led growth is a trade and economic policy aiming to speed up the industrialization process of a country by exporting goods for which the nation has a comparative advantage.

From the Great Depression to the years after World War II, under-developed and developing countries started to have the hard time economically. During this time, many foreign markets were closed and the danger of trading and shipping in war-time waters drove many of these countries to look for another solution to development. The initial solution to this dilemma was called import substitution industrialization.

Both Latin American and Asian countries used this strategy at first. However, during the 1950s and 1960s the Asian countries, like Taiwan and South Korea, started focusing their development outward, resulting in an export-led growth strategy. Many of the Latin American countries continued with import substitution industrialization, just expanding its scope. Some have pointed out that because of the success of the Asian countries, especially Taiwan and South Korea, export-led growth should be considered the best strategy to promote development.

*Insolvent external debt of Latin America*

Since the 1980 several countries in the region have experienced a surge in economic development and have initiated debt management programs in addition to debt relief and debt rescheduling programs agreed to by their international creditors. The following is a list of external debt for Latin America based on a 2012 report by The World Factbook.

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Table 5 External Debt for Latin America

Rank	Country – Entity	External Debt (million US\$)	Date of information
26	Brazil	405,300	31 December 2012.
35	Argentina	130,200	31 December 2012.
40	Mexico	125,700	31 December 2012.
45	Chile	102,100	31 December 2012.
49	Colombia	73,410	31 December 2012.
51	Venezuela	63,740	31 December 2012.
63	Peru	4,200	31 December 2012.
77	Cuba	22,160	31 December 2012.
78	Ecuador	20,030	31 December 2012.
81	Dominican Republic	16,580	31 December 2012.
82	Guatemala	16,170	31 December 2012.
83	Uruguay	15,900	31 December 2012.
85	Panama	14,200	31 December 2012.
86	El Salvador	12,840	31 December 2012.
88	Costa Rica	12,040	31 December 2012.
112	Nicaragua	5,228	31 December 2012.
114	Honduras	4,884	31 December 2012.
123	Bolivia	4,200	31 December 2012.
139	Paraguay	2,245	31 December 2012.

*Ref: author, 2014*

## *Openness and External debt to exports ratio*

Debt burden indicators include the (a) Debt to gross domestic production (GDP) ratio, (b) External debt to exports ratio, (c) Government debt to current fiscal revenue ratio etc. This set of indicators also covers the structure of the outstanding debt including the (d) Share of foreign debt, (e) Short-term debt, and (f) Concessional debt in the total debt stock.

Table 6 : External Debt to Exports Ratio

Country - Entity (million\$)	external debt	exports	Ratio (External debt/Exports)
Brazil	405,300	242,000	1.674793388
Argentina	130,200	85,360	1.525304592
Mexico	125,700	370,900	0.338905365
Chile	102,100	83,660	1.220415969
Colombia	73,410	59,960	1.224316211
Venezuela	63,740	96,900	0.657791538
Peru	4,200	47,380	0.088644998
Cuba	22,160	5,600	3.957142857
Ecuador	20,030	23,770	0.842658814
Dominican Republic	16,580	9,467	1.751346784
Guatemala	16,170	9,864	1.639294404
Uruguay	15,900	9,812	1.620464737
Panama	14,200	17,970	0.790205899
El Salvador	12,840	5,804	2.212267402
Costa Rica	12,040	11,470	1.049694856
Nicaragua	5,228	4,160	1.256730769
Honduras	4,884	6,946	0.703138497
Bolivia	4,200	11,770	0.356839422
Paraguay	2,245	4,700	0.477659574

*Ref: world fact book, 2012*

The ratio of gross external debt to exports provides a quick indicator of the capability of an economy to repay external debt with enhanced revenue from sales to foreign countries. A ratio below 1 suggests that debt can be repaid rapidly, theoretically in less than one year. Conversely, the higher the ratio, the lower the country's capability to finance the debt with revenue from exports.

Having discussed the capital inequality issue, attention to the export variable and need of comprehensive ratio analysis : debt to export ratio and capital to income ratio, we will now proceed to investigate the risk management status of Latin America.

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### *Risk management in major Latin America countries: (Mexico, Argentina, Brazil, Chile)*

Among Latin America, the adoption of solvency II which is EU directive - codifies and harmonizes the EU insurance regulation primary concerning the amount of capital that EU insurance companies must hold to reduce the risk of insolvency- is realistic in Mexico. In the second half of 2008, the Mexican regulator (Comisión Nacional de Seguros y Fianzas, or CNSF) shared with the Mexican association of insurance companies (Asociación Mexicana de Instituciones de Seguros, or AMIS) a draft of a project of insurance law (the proposed law) in which a Solvency II-type regime was incorporated. The draft considered an initial date for this proposed law of January 2012. Since that time (end of 2008) through 2009 and the beginning of 2010, the proposed law was discussed and reviewed between CNSF and AMIS. The actual initial date is January 2014. However, the proposed law did not approved by the Mexican Congress.

If the strong solvency regulation is existed like Argentina, the conflict of two regulations between local solvency regulation and international one should be considered for the stable adoption. The current framework does not seem to indicate that an extended application of the Solvency II methodology will be feasible in the near future, except for the offices and branches of European-based insurance companies.

The regulatory agency, SSN (Superintendencia de Seguros de la Nación) only mentioned the adoption of Solvency II without clear criteria. Actually, the insurance industry is tightly regulated in Argentina. SSN resolutions cover most aspects of insurance company activity, including unearned premiums and methods of mathematical reserve valuation. The agency establishes minimum valuation methods arising from formulas used to value out-of-court, mediation and lawsuit payables, as well as *incurred but not reported* (IBNR) claims reserves. Most insurance companies use these mechanisms to value their payables. As of 30 June 2011 (last fiscal year-end), all insurance companies in the market calculated their capital to be credited based on the issued premiums indicator. Of 155 insurers, only 4 carried minimum capital deficit as of this date. In recent months, the SSN announced the launch of a strategic plan of insurance, inviting all industry participants to bring their vision to define the insurance policy to be used during the period 2012–2020.

The existence of many solvency regulations can be analyzed with the conflict inside rules in Brazil so the Own Risk and Solvency Assessment (ORSA) is needed to integrate them. Brazil has adopted international regulations at each pillar. For Pillar I, the adoption of International Financial Reporting Standards (IFRS) as Brazilian generally accepted accounting principles (GAAP) in 2010. Detailed monthly reporting requirements of individual policy and claims data for the Insurance Supervisory Authority (Superintendência de Seguros Privados, SUSEP) were introduced in 2004 at the level of Pillar II. In 2004, the Supervisory Authority introduced the requirement that each insurance company should produce an annual actuarial valuation report proper to Pillar III.

In Chile, A new law that would require insurance companies to withhold risk-based capital was sent to Congress for approval on 30 September 2011. The methodology for calculating risk-based capital in Chile has yet to be made public. It is expected that the Chilean regulator will publish a consultative white paper with details around the calculation of risk-based capital in the third quarter of 2012. The SVS (Superintendencia de Valores y Seguros) has demonstrated interest in performing the first Quantitative Impact Study (QIS) by the end of 2012.

## Conclusion

A capital-labor split of Cobb-Douglas function which continues to be widely used by economists, has little empirical support. Even though neo-classical economists have proposed mathematical and theoretical realisms of economic growth by using the function, it was never empirically validated as the appropriate model for economic growth. Indeed, Thomas Piketty, a French economist, brought up this debated topic about capital inequality in his book, *Capital in the Twenty-First Century* in 2014.

I agree with him in that there is the structure of inequality with respect to both labor and capital actually changed since the ninetieth century of the chapter: Beyond Cobb-Douglas "The Question of the Stability of the Capital-Labor Split. Some research questions like "Did the Increase of inequality cause the financial crisis?",

“The illusion of marginal productivity”, “The Question of Time Preference” and “Is there an equilibrium distribution?” are fresh and fancy to break old fixed ideas.

I feel the solution is weak to support his brilliant idea enough. At the part4, the talk is suddenly changed to tax and pension (PAYGOs) without connection with previous capital inequality. Tax issues on Capital and Chinese millionaires are far from the real data of capital formation because it is very high value in China. We cannot see any empirical data of China's one in his book even though the major capital part is by China. It seems hard to accept a solution of redistribution by immigration and an opinion about the central bank just as a loan deal before redistribution of wealth.

In the article, the most recent data shows that export and external debt may be correlated to explain economy growth. In the paper, Latin America history pervades the claim that capital within GDP of Thomas Piketty should be enhanced by conceptual capital related to debt and export beyond GDP. In addition, to point out miscalculation of ratio analysis depending on economic size, the example by Roubini, N. (2001) is demonstrated. To conclude, through the case analysis of Latin America, in detail, economic size and debt sustainability as economic growth indicators are emphasized by empirical data.

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## PROFITABILITY DETERMINANTS OF INDIAN PRIVATE SECTOR BANKS- AN EMPIRICAL STUDY

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**Abstract:** *This research paper aims to examine determinants of profitability of private sector banks in India. These banks have registered impressive growth in different facets of banking and they have come to play an important role in Indian economy. Naturally profitability of these banks is matter of interest for bankers, policy makers and researchers. The study covers six variables viz. Cost to Deposit, Employee Cost to Total Expenses, Growth in Net Profit, Debt to Equity, Yield on Advances, Capital Adequacy Ratio and Profit After Tax to Total Income. These variables are studied for a period of ten years. The observations are analyzed using statistical techniques including multiple regression analysis. The Yield on Advances and Employee Cost to Total Expenses have emerged as most important factors affecting the profitability of private sector banks in India.*

**Keywords:** *Profitability, Private Sector Banks, Yield, Advances, India*

### INTRODUCTION

Banking sector in any country is considered as backbone of the economy as the performance of almost every sector of the economy gets reflected into the performance of banking sector in one or the other way. Till 1991 Indian banking sector was dominated by public sector banks. The onset of economic reforms which were intended to create a viable, competitive and efficient banking system in India to accelerate the economic growth had resulted into entry of many private sector banks. The private sector banks have registered impressive growth in last five years. As aptly brought out in the table appended herewith, Capital & reserves increased by 93.58% and equally impressive is the growth of deposits at 89.55%. The investments increased by 104.25% and Advances by 98.72%. Clearly the private sector banks have come to play important role in the Indian economy. They have adopted customer centric multi product approach to extend their reach. Extensive use of information technology resulted into manifold increase in the speed and accuracy of transactions which in turn brought about substantial reduction in transaction time and cost. E– banking is increasingly becoming popular.

However amidst the encouraging developments a close watch on profitability is a must as it is the profitability which would ensure long term health of private sector banks as at this juncture performance of private sector banks has become a matter of concern for planners and policy makers. At the same time profitability on sustained basis in private sector banks is a complex function of several variables such as deposits, advances, investments, employee cost, interest differential. This makes the profit generation task of bank managers extremely difficult. They

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simply cannot concentrate on all the variables. They have to ascertain key variables preferably based on research instead of merely relying on past practices. In this paper the author has made an attempt to examine the profitability determinants of private sector banks in India.

### LITERATURE REVIEW

To understand the dynamics of Bank's profitability the academia has widely examined the various aspects of banking from different angles. Some authors have examined macro economic factors such as consumer price index while others have examined micro economic factors such as NIM and yield from advances. A few authors have compared the performance of private sector banks with that of public sector banks. Their scholarly works are further discussed in the lines to follow.

David B. Humphrey and Lawrence B (1997) examined the profitability of 683 US banks and found that input prices and output prices had influence on profitability. Interest on deposit being one of the input which had negative effect on profitability. While Lawrence M. Seiford and Joe Zhu (1999) noticed a relationship with profitability. In their study of 55 US banking companies larger banks were found to be better in profitability while smaller banks were found to be better in marketability. Konstantinos Drakos (2002) mainly focused on net interest margin and its impact on profitability. In his study of 185 banks from different countries, it was found that NIM declined during the process of transition which in turn affected the profitability. Saumitra Chaudhuri (2002) examined State bank of India with its 7 subsidiaries and 19 nationalized banks from the year 1995-2001. Here the variable considered were yield from loans, advances and investment, cost of deposits, net interest margin of loans, advances, investments, and net interest spread. The study revealed that these variables were declining in case of public sector banks and there was no indication of improvement in the near future due to the burden of NPA. John Goddard, Phil Molyneux and John O.S Wilson (2004) studied 583 European banks from the year 1992-1998. The results revealed that current profit is an important prerequisite for future growth. As banks become larger their performance tends to improve but excessive current growth can damage the future profit. T. T. Ram Mohan and Subhash C. Ray (2004) used net interest spread and compared performance of public and private sector banks from a period during 1992-2002. They found that public sector banks performed better than private sector banks but not differently from foreign banks. Although the post reform period converged the performance of public sector banks and private sector banks. Güven Sayilgan and Onur Yildirim (2009) investigated the profitability of Turkish banks during the period 2002-2007. According to their study macro economic factors such as consumer price index affects profitability negatively in a statistically significant manner.

### NEED FOR STUDY

The private sector banks have come to play an important role in Indian economy. These banks can continue their contribution to economic development of the nation only if they remain profitable on sustained basis. Profitability of private sector banks therefore has been the concern not only for bankers but also the economic policy makers and researchers as well. In an attempt to contribute to the relatively limited literature on research pertaining to Indian private sector banks, the author decided to examine few micro factors affecting the profitability of these banks.

For our study we have considered the following variables to examine profitability dynamics of private sector banks in India:

1. Cash to deposits (CTD)
2. Employee cost to total expenses (ECTE)
3. % Growth in net profits (GNP)
4. Total Debt to Equity (DTE)
5. Yield on advances (YOA)
6. Capital Adequacy ratio (CAR)
7. PAT/ Total income (PATTI)

From amongst the above stated variables, PATTI is the dependent variable and the remaining are the independent variables.

## **HYPOTHESES DEVELOPMENT**

Considering the literature review and the variables stated above, the following hypotheses were developed:

1. Ho: Cash To Deposits does not affect PATTI.  
H1: Cash To Deposits affects PATTI.
2. Ho: Employee cost to total expenses doesn't affect PATTI.  
H1: Employee cost to total expenses affects PATTI
3. Ho: % growth in net profits doesn't affect PATTI.  
H1: % growth in net profits affects PATTI
4. Ho: Capital adequacy ratio does not affect. PATTI  
H1: Capital adequacy ratio affects PATTI
5. Ho: Total debt to equity doesn't affect PATTI  
H1: Total debt to equity affects PATTI
6. Ho: Yield on advances doesn't affect PATTI.  
H1: Yield on advances affects. PATTI

## RESEARCH DESIGN

### *Research Objectives*

The research objectives, therefore, are:

- (1) To understand the association of CTD, ECTE, GNP,DTE, YOA and CARwith PATTI of the private sector banks in India
- (2) To examine the influence CTD, ECTE, GNP, DTE, YOA and CAR exert over PATTI of the private sector banks
- (3) To gain insight into ascertainment of profitability determinants of private sector banks in India.

### *Data Collection and Techniques of Analysis*

For the purpose of this study, we have considered only the private sector banks registered with the Reserve Bank of India. The data required was historical and voluminous in nature. The said data was collected from published audited annual reports, data bases such as CAPITALine and web site such as money control.com. The data for all the variables viz. CTD, ECTE, GNP,DTE, YOA, CAR and PATTI was collected for each bank for a period of 10 years with a view to weed out cyclical effects of the economy and develop better understanding of the behaviour of the said variables. From this the banks for which full data for the complete time frame of 10 full years was not available were dropped in order to avoid statistical inaccuracies in the data analysis. Thereafter, measures of central tendency were worked out. Multiple Regression Analysis technique was used to investigate the relationship of independent variables with dependent variable and to know the extent of influence independent variables exert over the dependent variable. F test, Auto correlation Test - Durbin Watson test and Multi co linearity Test - VIF Statistics were carried out to lend greater validity to the results so arrived.

## RESULTS AND DISCUSSIONS

(1) The standardized  $\beta$  representing regression co-efficients of the independent variables with their respective direction, values and significance level are given in the Table- 1. As stated in the said table, standardized  $\beta$  of CTD is  $-0.081$ . This indicates that CTD has negative relationship with PATTI. However the significance level of 0.158 points out that the beta (CTD) is statistically not significant. Thus the weight of the evidence suggests that null hypothesis  $H_0$  (CTD) be accepted and the alternate hypothesis  $H_a$  (CTD) be rejected. This means CTD does not exert influence over PATTI.

(2) ECTE, as shown in Table-1, has standardized  $\beta$  value of  $-0.244$  indicating that ECTE has negative relationship with PATTI. It's significance level 0.002 points out that this regression co-efficient is statistically very important. The weight of the evidence, therefore, suggests that null hypothesis  $H_0$  (ECTE) be rejected and the alternate hypothesis  $H_a$  (ECTE) be accepted. This means a change in ECTE has considerable influence over PATTI of the private sector banks.

(3) Table -1 further shows that the standardized  $\beta$  of GNP stands at + 0.109. This indicates that GNP has positive relationship with PATTI. Its significance level 0.090 indicates that the said regression co-efficient is statistically significant in a moderate manner. The weight of evidence, therefore suggests that null hypothesis  $H_0$  (GNP) be rejected and the alternate hypothesis  $H_a$  (GNP) be accepted. This means GNP exerts moderate influence over PATTI.

(4) The standardized  $\beta$  of DTE, as shown in Table -1, stands at + 0.132. This indicates that DTE has positive relationship with PATTI. The corresponding significance level of 0.070 points out that the said regression co-efficient is statistically significant in a moderate manner. The weight of evidence suggests that null hypothesis  $H_0$  (DTE) be rejected and the alternate hypothesis  $H_a$  (DTE) be accepted. This means DTE exerts moderate influence over PATTI of private sector banks.

(5) The standardized  $\beta$  of YOA as shown in Table -1, is + 0.996. This indicates that YOA has a positive relationship with PATTI. The corresponding significance level of 0.000 clearly points out that the said regression co-efficient is statistically very significant.

The weight of evidence therefore suggests that null hypothesis  $H_0$  (YOA) be rejected and the alternate hypothesis  $H_a$  (YOA) be accepted. This means YOA exerts substantial influence over PATTI. An increase in YOA will bring about an increase in the profitability by number of times the standardized  $\beta$  value of YOA. Thus YOA appears to be the most important determinant of PATTI.

(6) The standardized  $\beta$  of CAR, as shown in Table -1, stands at + 0.009. This indicates that CAR has very weak positive relationship with PATTI. The corresponding significance level of 0.927 renders this regression co-efficient statistically insignificant. The weight of evidence suggests that null hypothesis  $H_0$  (CAR) be accepted and the alternate hypothesis  $H_a$  (CAR) be rejected. This means CAR does not exert any significant influence over PATTI.

(7) The results of F test given in Table – 2, clearly shows  $F = 97.218$  at a significance level of 0.000 with df ( 6, 9 ). This indicates that all regression co-efficients will be non zero.

(8) The results of Auto correlation Test i.e. Durbin Watson statistics placed at Table – 2 shows  $D = 1.929$  .

For  $N=16$ ,  $dL = 0.84$  and  $dU = 1.09$  . As a result,  $D > dU$  and  $4 - D > dL$  , This means that there is no cause of concern from view point of either positive or negative auto correlation amongst the independent variables.

(9) The multi co linearity amongst the independent variables has been checked through Matrix of Co-efficients of Correlations given in Table - 3 and VIF statistics stated in Table – 1. The said matrix of co-efficients of correlations reveals that none of the six independent variables has the co-efficient larger than  $\pm 0.7$  . Hence, there is no cause of concern from viewpoint of multi co linearity amongst the independent variables. This is further confirmed by the VIF (Variance Inflation Factor) statistics placed at Table-1. Each of VIF statistics is less than 10 and each of the VIF centering around the mean thereof.

## PROFITABILITY DETERMINANTS OF INDIAN PRIVATE SECTOR BANKS- AN EMPIRICAL STUDY

The test outputs described at points (7), (8), and (9) above provide considerable reliability to the results and the emerging Multiple Regression Equation is as under:

$$\begin{aligned} \text{PATTI} = & + 0.053 - 0.081 ( \text{CTD} ) - 0.244 ( \text{ECTE} ) + 0.109 ( \text{GNP} ) \\ & + 0.132 ( \text{TDE} ) + 0.996 ( \text{YOA} ) + 0.009 ( \text{CAR} ) \end{aligned}$$

The adjusted R<sup>2</sup> i.e. the co-efficient of determination, as shown in Table-1, stands at 0.975 indicating that the equation can explain 97.5% variations in PATTI. For the remaining variations i.e. unexplained variations, some other variables are responsible.

(10) The descriptive statistics pertinent to the analysis are depicted in Table -4

The predictive value of the analysis will be greater if the data set of the private sector bank to be studied closely resemble the pattern of descriptive statistics given in the said table.

## FINDINGS & RECOMMENDATIONS

### *Cash To Deposits ( CTD)*

The Cash to deposit ratio is found to have negative relationship with profit to after tax to total income ratio. However the significance level makes it irrelevant. This leads us to believe that CTD is not an important variable influencing the profitability.

### *Employee Cost to Total Expenses (ECTE)*

The, employee cost to total expenses ratio bears a negative relationship with profit to after tax to total income ratio with significance level standing at 0.002. It means ECTE ratio plays an important role in influencing the profitability. Lesser the ECTE better it is. This leads us to believe that, the private sector bank management would like to keep ECTE at lower level as it bears negative relationship with the profitability.

### *% Growth in Net Profits (GNP)*

The, % Growth in Net Profits ratio is found to have positive relationship with PATTI ratio with significance level standing at 0.090. It means GNP ratio plays a moderately important role in influencing the profitability. Higher the GNP better it is for the bank. The private sector bank management would like to keep GNP at higher levels to improve upon the profitability. This is partly in confirmation to research findings of John Goddard, Phil Molyneux and John O.S Wilson (2004) to the extent that profit and growth are inter related

### *Debt To Equity (DTE)*

The DTE ratio has a positive relationship with PATTI ratio with significance level standing at 0.070. In means DTE plays a moderately important role in influencing the profitability. The bank management finds debt cheaper than equity probably due to difficulties associated with servicing of large equity base on a sustainable basis. Large equity base is partly mandatory. The management would like to keep it at higher level as it bears positive relationship with the profitability.

### *Yield On Advances (YOA)*

The YOA bears a positive relationship with PATTI ratio with significance level standing at 0.000. The power of this regression coefficient is the highest at 0.996 amongst all the independent variables. In means YOA plays a critical role in influencing the profitability. Higher the YOA better it is for the bank. This leads us to believe that Advances is the portfolio – the traditional bastion of bankers – is still the most important contributor to the profitability of banks. The banks' management, therefore, would like to keep it at the highest possible level.

### *Capital Adequacy Ratio (CAR):*

The CAR bears a positive relationship with the PATTI of the bank. However, the unacceptable significance level does not allow it to be important. The CAR therefore is not viewed as important variable influencing the profitability of the bank. It therefore carries importance from view point of statutory compliance.

## **RECOMMENDATIONS & MANAGERIAL IMPLICATIONS**

Considering the analysis and findings discussed above YOA with highest power of regression coefficient and highest level of significance emerges as the most important determinant of profitability of private sector Indian banks. YOA is followed by ECTE, DTE and GNP in the descending order of importance. The other two variables viz. CTD and CAR are not important from viewpoint of profitability of bank. "Advances portfolio" a traditional portfolio of present day bankers is the largest contributor to the profitability of banks. Therefore the practicing managers in the private sector banks should attach greater importance to management of YOA, ECTE, DTE and GNP to improve profitability of the banks. This has broader ramifications in the sense that management of YOA, ECTE, DTE and GNP will become important performance criteria for managers. They may as well find a place in the balance score card if the bank uses one. The academicians should devise superior models for Management of YOA, ECTE, DTE and GNP.

## **FUTURE RESEARCH DIRECTIONS**

The present study focuses on private sector banks in India. Replication studies can be carried out to examine the influence of variables used in this study for other sectors of banking industry in India such as public sector banks, cooperative banks etc. before generalizing the results. A global research study to compare profitability determinants of banking sector in developed nations with the ones in developing nations can also be carried out. Further research can also be conducted by encompassing more variables such as growth rate of economy and participation in international foreign exchange trade etc.

# PROFITABILITY DETERMINANTS OF INDIAN PRIVATE SECTOR BANKS- AN EMPIRICAL STUDY

## ANNEXURE -1

### VARIABLES CONSIDERED DURING THE COURSE OF THE STUDY

SR. NO.	NAME OF THE RATIO.	FORMULA OF THE RATIO.
1	Cash to deposits	Cash/deposits.
2	Employee cost to total expenses	Employee cost/total expenses.
3	% growth in net profits	(Net profits in year X- net profits in year X-1)/ net profits in year X-1.
4	Total debt to equity	Total debt/ shareholder's equity+ reserves & surplus.
5	Yield on advances	Net profits/ total advances made.
6	Capital adequacy ratio	(Tier one capital+ Tier two capital)/ risk weighted asset
7	Profit After Tax to Total Income	Profit after tax/ total income.

Table No: 1  
Regression Co-efficients , Significance Level & VIF  
Private Sector Banks

	Standardised Regression Co-efficients ( Beta)		t	Significance Level	Collinearity Statistics  VIF
	Direction	Value			
Constant	+	0.053	0.852	0.416	
CTD	–	0.081	-1.541	0.158	1.655
ECTE	–	0.244	-4.247	0.002	1.961
GNP	+	0.109	1.902	0.090	1.929
DTE	+	0.132	2.057	0.070	2.425
YOA	+	0.996	12.176	0.000	3.963
CAR	+	0.009	0.094	0.927	5.058

**Independent variables= CTD, ECTE, GNP, DTE, YOA, CAR.**

**Dependent variable= PAT to Total income. N= 16 Adjusted R square=0.975**

Table - 2

ANNOVA Private Sector Banks

Model	Sum of Square	df	Mean square	F	Significance	Durbin Watson
Regression	0.060	6	0.010	97.218	0.000	1.929
Residual	0.001	9	0.000			
Total	0.061	15				

Table No: 3

**Matrix of Co-efficients of Correlations Private Sector Banks**

	CTD	ECTE	GNP	DTE	YOA	CAR
CTD	1.000	0.101	0.247	0.387	0.239	-0.112
ECTE	0.101	1.000	0.426	0.328	-0.059	-0.127
GNP	0.185	0.426	1.000	-0.123	0.397	0.133
DTE	-0.078	0.328	-0.123	1.000	-0.522	-0.701
YOA	0.191	-0.59	0.397	-0.522	1.000	0.775
CAR	-0.112	-0.127	0.133	- 0.701	0.775	1.000

Table – 4

Descriptive Statistics - Private Sector Banks

## PROFITABILITY DETERMINANTS OF INDIAN PRIVATE SECTOR BANKS- AN EMPIRICAL STUDY

	PATTI	CTD	ECTE	GNP	DTE	YOA	CAR
Mean	.094	.071	.12	-.67	14.46	.018	12.61
Minimum	-0.089	.057	.052	-11.77	5.76	-0.016	10.425
Median	0.107	0.07	0.0815	-5.779	14.985	0.0185	12.955
Maximum	0.168	0.094	0.203	0.789	23.662	0.038	16.578
Std. Dev.	0.0634	0.010	0.039	3.115	4.043	0.012	1.631

### APPENDIX 1 Statistics – Private Sector Banks

	(Rs. Millions)				
	2008-09	2009-10	2010-11	2011-12	2012-13
<b>Capital, Reserves &amp; Surplus</b>	<b>996686</b>	<b>1199839</b>	<b>1385664</b>	<b>1592952</b>	<b>1929461</b>
<b>Deposits</b>	<b>7363776</b>	<b>8228007</b>	<b>10027588</b>	<b>11745874</b>	<b>13958355</b>
<b>Investments</b>	<b>3065312</b>	<b>3541169</b>	<b>4220576</b>	<b>5259822</b>	<b>6261063</b>
<b>Advances</b>	<b>5753276</b>	<b>6324409</b>	<b>7975440</b>	<b>9664182</b>	<b>11432486</b>

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## THE PREDICTIVE POWER OF THE J-CURVE

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**Abstract.** *Dealing with a recurring low level of data quality, we approach the behavior of Private Equity Funds (PEFs) by using illiquidity as a factor of analysis. PEF cash-flows (“J-Curves”) are the basis of the research. After identifying aggregated PEF return categories (“ideal-types”), individual J-Curves are compared with the ideal-types. The resulting model acts as a predictor of future performance of PEF, excluding first return categories; and then attributes a fund to a specific category with a certain level of confidence. This model could help reduce solvency costs associated with investing by PEFs, and support the on-going assessment of active PEFs.*

**Keywords:** private equity (PE), venture capital (VC), leveraged buy-out (LBO), cash-flow, solvency ratio, J-curve

*JEL classifications:* G24; G28; G32

## INTRODUCTION

Current and future solvency and prudential ratios use historical risk-return profiles of Private Equity Funds (PEF). Resulting ratios are artificially high (e.g. EDHEC, 2010; Studer and Wicki, 2010) for European insurance groups). Amending solvency and prudential ratios to take into account the specificities of investing in private equity is difficult, for four reasons.

First, the performance of PEFs is only known once these closed-end funds are liquidated, after 10 to 12 years. The temptation to use earlier measures of performance, notably internal rates of return (IRRs), should be avoided (Kocis *et al.*, 2009, Ch. 7; and Gottschalg, 2012). IRRs are based on quarterly net asset values (NAVs), interim valuations of PEFs mixing realized and unrealized returns, the latter being estimated by PEF managers themselves<sup>1</sup>. They are sensitive to early distributions (such as “dividend recaps<sup>2</sup>” in LBO), and to external events such as portfolio reevaluations to prepare a fund raising (Jenkinson *et al.*, 2013).

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<sup>1</sup> NAV calculations are defined by the professional associations in the International Private Equity and Venture Capital Valuation Guidelines (IPEV) that EVCA co-authored (2012), and the accounting standards such as IFRS (SFAS 157) and US GAAP (FASB 820, IAS 39). The NAV is the residual value of a PEF: related to the total invested capital; it provides a ‘residual value to paid-in capital’ (RVPI) ratio, which decreases as investments are realized (and hence account as DPI). The sum of DPI and RVPI forms the ‘total value to paid-in capital’ (TVPI), which is the multiple of the investment of the fund.

<sup>2</sup> LBO fund managers increase the debt of the holding of a given portfolio company to generate an anticipated profit distribution.

## THE PREDICTIVE POWER OF THE J-CURVE

Higson and Stucke (2012) recommend using data from fully liquidated funds only, which is difficult in practice due to the time-lag involved. To address this difficulty, this research focuses on the profile of cumulated cash-flows of PEFs over their life times: the “J-curve” (Meyer and Mathonet, 2005). The definition of PEFs’ J-Curves is important, as some misunderstandings on their inputs and signification have led some practitioners to reject it (Mulcahy *et al.*, 20123).

The second reason amending ratios is tough is that the analysis of PEFs is affected by a recurring lack of transparency (Higson and Stucke, 2012). Modern private equity investing (i.e., through funds) is recent. The activity started in the 1970s in the US for leveraged buy-outs (LBO) and venture capital (VC), in the 1990s for the rest of the developed world, and essentially after 2000 for remaining countries (Demaria, 2010, Chapters 1 & 2). Geographical markets hence exhibit different levels of maturity, and performances history is limited to thirty years of activity, at best. Data is dominated by US figures, which represent 60% of documented worldwide investments (Exhibit 1). Ljungvist and Richardson (2003) note that 91.1% of the 73 funds of their sample are based in the US (7.5% in Europe, 1.5% in Latin America). Though some American institutions, such as public pension funds, have the obligation to disclose the structure and the performance of their private equity portfolio under the Freedom of Information Act (and the jurisprudence *CalPERS vs San Jose Mercury News*, 2002), data remains scarce and patchy.

Exhibit 1. Geographical repartition of investments, by region, by deal number and by volumes of investments,

This table sums up all PE investments (excluding real estate) done between January 1, 2005 and December 31, 2010, as reported by Thomson ONE Banker4. All monetary numbers are in nominal U.S. dollars.

Company location by region	Nb. of investments	Fraction of investments (%)	Nb. of Companies	Fraction of companies (%)	Sum of Equity Invested (USD Mil)	Fraction of equity invested (%)
Americas	42 663	59.58	21 213	51.01	616 164.68	60.98
Europe	18 659	26.06	12 764	30.69	231 017.02	22.86
Asia	8 657	12.09	6 483	15.59	140 900.71	13.95
Pacific	1 241	1.73	773	1.86	17 934.23	1.77
Africa	383	0.53	354	0.85	4 381.49	0.43
<b>TOTAL</b>	<b>71 603</b>	<b>100.00</b>	<b>41 587</b>	<b>100.00</b>	<b>1 010 398.13</b>	<b>100.00</b>

3 As a matter of fact these authors have computed IRRs instead of cash-flows to draw their curves, hence leading to a misunderstanding of the use of the J-Curve itself.

4 At the time of writing, only figures as of September 30, 2011 are known. In order to deliver complete years, we chose to limit our five years summary as of December 31, 2010.

A third reason for complications is that PEFs are subject to activity and performance “waves” (for US LBO: Higson and Stucke, 2012; for US VC: Robinson and Sensoy, 2011), materialized in an increase in funds raised, in investments and in company valuations; and a decrease of returns (Higson and Stucke, 2012; Harris et al., 2012). However, though fund flows are positively related to past performance, Kaplan and Schoar (2005; confirmed by Higson and Stucke, 2012, and Harris *et al.*, 2012) find no significant relation between performances and fund sizes (in LBO). While assets under management have increased from USD 10 billion in 1991 to 180 billion in 2000 (Kaplan and Schoar, 2005) and 3 trillion in 2012<sup>5</sup>, PE returns have been decreasing (Higson and Stucke, 2012; Harris *et al.*, 2012).

The fourth challenge to amending solvency and prudential ratios is that PE exhibits a strong volatility of fund performances within a vintage year (VY), and from one VY to the other (Kaplan and Schoar, 2005).

To address these challenges, this research capitalizes on the fact that all PEFs exhibit a cash-flow pattern described as a J-curve. This constant will be used to approach PEF performance: illiquidity being a fundamental defining factor of private equity investing, this research will use J-curves to deepen the understanding of the sector. The first step is to identify categories of returns among J-curves (“ideal-types”) so as to qualify their past, present and future behavior through modeling and projections.

The purpose of this paper is to analyze the behavior and performance of PEFs based on their reported cash-flows, in order to predict the performance of PEFs; and possibly support an effective calibration of solvency and prudential ratios for investors in private equity.

After setting the empirical framework and reviewing the literature, the data and the methodology adopted are presented. The results are then discussed followed by the limits of the findings and perspectives for further research.

## EMPIRICAL FRAMEWORK AND LITERATURE

### *Private equity fund organization and processes*

PEFs are usually structured as closed-end limited partnerships with a lifespan of ten years (optionally extended by two times one year). PEF investors (“limited partners”, or LPs) commit to these funds during the fundraising period. Commitments added up become the “fund size”. The fund creation date defines its “vintage year” (VY), and is used to benchmark this fund with its peers applying the same strategy in the same geographical area. PEFs are managed by “general partners” (GPs), who draw down the capital (“capital calls” or “draw downs”) to pay management fees and invest in (usually non listed) companies (“paid-in”).

LPs usually commit 99% of the fund size, and the GP is expected to commit 1% of the fund size. Capital is called during the investment period of the fund (usually five years, optionally extended by one year). Once the investment period over, the fund stops new investments (it can reinvest in VC portfolio companies if needed) and starts its divestment period (the remaining five to seven years). At any time during the fund’s life, the fund can sell a portfolio company and distribute the proceeds to investors (“distributions”). Depending on the limited partnership agreement (LPA), the GP can recycle some of the proceeds to invest

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<sup>5</sup> See: “Private equity assets record USD 3 trillion” (<http://www.preqin.com/item/private-equity-assets-hit-record-3-trillion/102/5477>, last accessed 18/4/2013).

the fund up to 100%. If not, then the amount invested will be lower than the fund size (the difference being fees paid out).

Depending on the LPA, management fees are calculated as a proportion of the fund size (committed capital) or capital called in the investment period, and as a proportion of the net invested capital or the NAV during the divestment period. Management fees amount to between 1.5% to 3% per year (Gompers and Lerner, 1999): medians are 2.5% for VC funds and 2% for LBO funds (Robinson and Sensoy, 2012). Additional fees can be charged to the fund, including costs such as the set-up fee, the expense of due diligence to assess a potential portfolio company, auditing, fund administrator or custodian fees, and other additional expenses. To further align the interests of GPs and LPs, a performance fee (the “carried interest”) is paid to GPs, calculated on the profit of the fund (usually 20%, though it can vary between 15 and 30% and depends on the GP’s past performances (Robinson and Sensoy, 2012). Depending on the LPA, the carried interest can be paid deal-by-deal or on the overall performance of the fund, often after distributing to the LPs an annual preferred return rate of return (or “hurdle rate”) of 6 to 8% calculated on the amounts drawn down. Once the hurdle rate paid, a pro-rata (or “catch-up”) is paid to the GP. Further proceeds are then split between distributions and carried interest as agreed upon.

### *Poor available information*

One cannot ignore the problems associated with private equity data in published studies. To study the PE sector, a first panel of studies worked with data from a single source, usually a PEF investor (Ljungvist and Richardson, 2003; Lerner *et al.*, 2007; Robinson and Sensoy 2012), or with harmonized databases maintained by service providers (Cambridge Associates (Exhibit 2) and Burgiss) sourced from their clients (LPs). It is difficult to generalize about these findings: though data gathered is coherent, as a direct result of the investment monitoring by LPs, PE investment strategies (and returns) depend on the type of investor, their total assets under management, the set-up, the localization (home-investing bias), the number of years of experience and know-how, preferences and approach to PE investing (Lerner *et al.*, 2007; Hobohm, 2010), as well as the legal structure, and regulatory constraints. For example, 60% of the LPs surveyed by Burgiss are public and corporate pension funds, and 20% are endowments and foundations (Harris *et al.*, 2012). Hence, Burgiss and Cambridge Associates cover the LP landscape only partially.

A second panel of studies uses commercial data from providers such as Thomson (Exhibit 2), which provide only a partial perspective on PE returns. Some database providers collect public information and voluntary disclosure from LPs. Thomson provides data on an aggregated basis to preserve the confidentiality of the underlying source. However, commercial databases are affected by biases (Higson and Stucke, 2012; Harris *et al.*, 2012) as funds sometimes provide incomplete cash-flows. One of the issues affecting the quality of data is the treatment of funds with no cash flow while still active (for which presumably the GP failed to report so NAVs were replicated from one quarter to the other). Thomson used to keep them on record, as a result of which the IRRs of these funds declined, hence mechanically lowering the returns (Stucke, 2011). Higson and Stucke (2012) argue that VYs 1980 to 1993 are reliable. This detail should strengthen our results<sup>6</sup>.

PE returns are usually reported net of fees. The difference between gross and net returns is due to management fees, the carried interest of the GP, and additional fees and expenses

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<sup>6</sup> We have flagged 43 inconsistencies in Thomson’s database, some of which were later removed by the database provider between August and November 2012.

necessary to the functioning of the PEF. However, if details are not provided, it is impossible to separate investments from expenses in the cash-flows of a fund; nor to differentiate distributions between refund and profits. Thomson ONE does not provide details on operational fees (e.g. transaction and monitoring), or on operational distributions (Board compensation, advisory), which can be split between LPs and GPS, or be fully allocated to LPs or to GPs, hence making it difficult to estimate. Only net data provided by LPs is communicated (the database provider does provide gross cash-flows) so errors and biases on reporting net cash-flows cannot be assessed.

Fund terms are increasingly negotiated between LPs and GPs<sup>7</sup>. Some GPs offer the choice between a 1% management fee and a 30% carried interest, and a classical 2%-20%. Others offer a progressive carried interest, or solutions to lower<sup>8</sup> the marginal cost of investing in PE. Given the increased diversity of the PEFs' terms and conditions (Banal-Estañol and Ippolito, 2012), it is methodologically more rigorous to work on gross returns.

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<sup>7</sup> See for example: Primack, Dan, "Random Ramblings", Term Sheet, *Fortune*, 05/06/2012 (<http://finance.fortune.cnn.com/category/term-sheet/> - accessed 5/6/2012)

<sup>8</sup> Some fund managers offer co-investment programs to investors: see *Private Equity International*, The 'trouble' with preferential treatment, The Friday Letter, 03/07/2012 (<http://www.privateequityinternational.com/Article.aspx?aID=0&article=68163> - accessed 9/7/2012)

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Exhibit 2. Net returns of VC, “private equity” and LBO funds in the US and EMEA

This table provides average and median IRRs, and TVPIs of VC, “PE” and LBO funds for VYs 1980 to 2010, as reported by Cambridge Associates (as of June 30, 2012) and Thomson ONE Banker (as of December 31, 2011).

	US Venture Capital				US LBO				EMEA VC				EMEA LBO			
	Cambridge Associates				Thomson One				Cambridge Associates**				Thomson One			
	Average	Median	TVPI	Sample	Average	Median	TVPI	Sample	Average	Median	TVPI	Sample	Average	Median	TVPI	Sample
Vintage year	IRR (%)	IRR (%)			IRR (%)	IRR (%)			IRR (%)	IRR (%)			IRR (%)	IRR (%)		
1980	-	-	-	-	14	13.34	13.35	2.30	-	-	-	-	-	-	-	-
1981	9	9.01	7.87	1.76	21	7.81	9.60	1.81	-	-	-	-	3	7.08	6.44	1.84
1982	11	7.20	7.92	1.79	28	2.63	3.79	1.39	-	-	-	-	-	-	-	-
1983	28	9.55	8.72	2.01	58	5.37	5.03	1.71	-	-	-	-	4	9.69	9.61	2.02
1984	32	7.74	6.27	1.76	63	4.99	3.54	1.57	-	-	-	-	6	5.83	7.84	1.68
1985	26	11.70	12.86	2.69	46	8.19	8.63	2.02	-	-	-	-	16	0.94	4.65	1.45
1986	30	8.82	9.43	2.90	38	7.19	5.97	1.70	11	12.82	11.13	3.41	10	7.36	5.68	1.54
1987	34	14.53	15.65	2.72	64	7.55	7.15	2.02	12	13.15	10.82	1.86	8	4.71	3.69	1.41
1988	26	14.32	11.87	2.50	45	12.16	9.22	2.03	17	14.02	12.30	2.00	11	(5.50)	2.98	1.21
1989	37	17.05	13.31	2.59	50	12.68	10.83	2.11	18	20.31	20.51	2.58	20	1.66	4.65	1.75
1990	17	24.07	21.54	3.15	23	17.11	13.67	2.22	8	15.00	15.06	1.84	14	10.78	8.10	2.51
1991	16	23.10	17.61	3.06	17	14.58	14.10	2.12	11	31.21	38.85	3.27	5	20.26	20.45	2.74
1992	23	28.67	20.99	3.13	28	27.63	14.37	3.43	15	26.24	18.63	2.88	6	12.30	15.56	1.91
1993	37	29.53	18.81	4.13	41	21.89	12.02	2.92	25	18.30	21.74	2.29	11	4.78	0.21	1.45
1994	42	34.25	26.45	5.40	36	25.92	23.74	3.22	21	13.60	9.68	2.41	16	6.48	6.67	1.85
1995	36	54.83	38.50	5.98	48	41.09	20.33	3.84	33	16.15	10.91	1.95	13	1.31	(0.11)	1.05
1996	41	61.19	40.87	5.01	38	63.31	28.15	4.43	37	9.59	7.94	1.57	18	25.33	5.27	2.04
1997	71	53.74	9.65	3.11	61	52.55	19.97	2.61	51	5.52	7.45	1.41	40	5.97	2.98	1.21
1998	82	16.47	(0.45)	1.49	80	25.09	1.65	1.66	54	10.49	9.64	1.42	33	6.72	(0.19)	1.46
1999	115	(3.59)	(3.41)	0.95	106	(4.27)	(5.12)	0.87	54	12.18	11.84	1.83	38	3.59	3.33	1.25
2000	154	(3.00)	(2.40)	1.01	122	(2.74)	(2.66)	0.91	75	12.94	12.38	1.78	51	11.19	10.92	1.63
2001	53	(1.14)	(0.21)	1.12	60	2.78	1.27	1.17	24	23.86	21.48	2.06	27	13.54	10.65	1.57
2002	34	1.43	1.80	1.01	19	(0.42)	(1.49)	0.96	33	15.82	16.61	1.89	19	13.24	13.64	1.52
2003	37	(0.45)	0.62	1.32	21	2.71	1.08	1.10	36	15.08	12.91	1.75	17	7.59	10.61	1.62
2004	66	2.42	0.69	1.43	28	2.37	1.56	1.32	64	11.16	9.97	1.52	21	14.38	10.62	1.54
2005	61	1.54	2.86	1.20	23	4.90	4.32	1.26	87	8.10	8.48	1.30	33	7.19	6.47	1.26
2006	76	4.22	5.14	1.25	44	0.25	0.78	1.03	77	9.79	8.29	1.21	35	5.15	3.90	1.15
2007	61	11.04	7.91	1.36	24	8.09	8.15	1.33	83	8.48	8.97	1.21	37	9.13	7.47	1.25
2008	54	6.58	5.63	1.25	20	6.87	6.29	1.14	66	10.49	9.79	1.19	29	13.19	12.73	1.26
2009	19	5.14	10.11	1.32	13	7.14	5.35	1.08	24	10.97	9.59	1.04	10	8.84	1.26	1.12
Fully Real. Av.	43.81	19.91	13.42	2.77	49.40	16.68	9.94	2.18	29.13	15.96	15.02	2.16	23.61	14.48	11.72	1.96
Active Fds Av.	51.00	3.99	4.35	1.27	24.00	3.99	3.26	1.15	58.75	11.24	10.58	1.39	25.13	9.84	8.34	1.34
All Funds Av.	45.79	15.52	10.92	2.36	42.63	13.29	8.15	1.91	39.00	14.39	13.54	1.90	24.08	13.05	10.68	1.77
													28.18	3.36	1.94	1.39
													18.84	12.02	9.10	1.63

\* Vintage years 2000 and 2001, though having reached their 10-year lifespan, might still be active and under life extension periods.

\*\* Cambridge Associates mixes LBO, growth, energy and mezzanine funds in the same benchmark.

\*\*\* Source: Worldbank, annual GDP growth rate at market prices, based on local constant (2000) currency.

\*\*\*\* Source: Eurostat, real GDP growth rate ([http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search\\_database](http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database) - accessed July 12th, 2012).

\*\*\*\*\* Simple average only

## DATA AND METHODOLOGY

Cash-flows of US and European VC and LBO funds are extracted over different periods to build average cash-flow curves. Data is available on a quarterly basis and aggregated. The first step is to analyze draw-down and distribution patterns of PEFs so as to understand their behavior. The second step is to characterize the evolution of cash-flow curves and assess their predictive power for the future outcome of PEFs. Only liquidated funds are used.

### *Draw-downs interpretation*

Data blends fees and actual investments in draw-downs. This assumes an actual use of the capital, which is methodologically correct as our approach follows cash outflows. Net draw-downs cannot theoretically exceed 100% of the fund size.

Robinson and Sensoy (2012), declare that the expected investment pace for VC funds is 39%, 18%, 15%, 16% and 12% in years one through five, respectively. For LBO funds, it is 22%, 22%, 20%, 19% and 17%. Ljungvist and Richardson (2003) state that it takes six years on average for 90% of the committed capital to be called, which is coherent with standard investment periods of five years. The pace of draw downs is 16%, 20% and 20% of committed capital called in the first three years of operation. By year 10, on average, funds are called at 93.6%. Kaserer and Diller (2004) state that average European PEFs draw down 23% of total committed capital in the first year, and 60% within the first three years. The payback is after 7 years. Differences come from macro-economic conditions. Committed capital is not called up to 100% after five years, as some is needed to pay management fees (and in the case of VC funds, for follow-on rounds in existing investments).

### *Distributions interpretation*

From the proceeds of liquidity events such as trade sales and initial public offerings, funds return the capital and then distribute capital gains to LPs (though stock distributions can happen - “distributions in-kind” - they are essentially cash distributions). Using only cash distributions can lower the outcome of the considered PEFs. In particular, data from VC funds from the decade 1980 shows substantial tail distributions after year 13. To prevent results from being affected by potential glitches in the data, a limit of fifteen years of PEFs activity has been set.

### *Data description and cycles identification*

Data reported from Cambridge Associates and Thomson ONE (Exhibit 2) provide sample sizes, average and median IRRs, and average fund multiples (“total value to paid-in”, or TVPI). If there are fewer than three funds in the sample, data are not provided. We have focused on the period prior to 2001 (fully liquidated funds). Thomson ONE provides VC and LBO data for the USA, and for Europe, Middle-East and Africa (EMEA). PE activity in the Middle-East and Africa started recently and should not significantly bias data for Europe. As Cambridge Associates provides data only for the US, and also separates VC from “PE” (that is to say LBO, mezzanine, energy and growth funds), it is used as a support to identify cycles.

The simple average IRR for US VC funds is 19.9% for Cambridge (1981-2001, with 920 funds reporting data) and 16.7% for Thomson (1980-2001, 1087 funds). Median IRRs are respectively for the same periods 13.4% and 9.9%. Average TVPIs are respectively 2.8x and 2.2x. Extending the considered periods to 2009, average IRR, median IRR and TVPI are

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respectively for Cambridge (1328 funds) 15.5%, 10.9% and 2.4x; and for Thomson 13.3%, 8.2% and 1.9x (1279 funds). For US “PE”, the average IRR on 466 fully realized “PE” funds for Cambridge Associates (1984-2001) is 16.0%, the median IRR is 15.0% and the TVPI is 2.2x. For US LBO, Thomson provides an average IRR on 425 fully realized funds of 14.5%, a median IRR of 11.7% and a TVPI of 2.0x. With the inclusion of VYs through 2009, the average IRR, median IRR and TVPI are respectively for Cambridge Associates (936 funds) 14.4%, 13.5% and for Thomson 1.9x; and 13.1%, 10.7% and 1.8x (626 funds).

Based on 447 EMEA VC funds (1981 and 1983-2001), Thomson provides an average IRR of 5.9%, a median IRR of 4.2% and a TVPI of 1.6x. Extending the period considered to 2009 (789 funds), the average IRR is 3.4%, the median IRR 1.9% and the TVPI 1.4x. Based on 269 EMEA LBO funds (1984 and 1986-2001), Thomson provides an average IRR of 14.5%, a median IRR of 11.8% and an average TVPI of 1.8x. Extending the period to 2009 (471 funds), the average IRR is 12.0%, the median IRR 9.1% and the TVPI 1.6x. Cambridge Associates does not disclose its benchmarks except for the US.

Based on this data and initial background, each VY is attributed to a return category. Exhibit 3 sums up the attribution mechanism.

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Exhibit 3. Initial return categorization (“ideal-type”) of average US and EMEA VC and LBO fund by VY through reading

These tables provide the results of the categorization of average US VC and LBO funds; and EMEA VC and LBO funds by VY, based on initial reading for fully realized funds based on average and median IRRs, and TVPIs for an attribution in one of the four ideal-type categories (low returns, medium returns, high returns and very high returns). Data reliability is put in perspective, notably for vintages identified as problematic (signaled by a minus sign). Outliers are signaled by an “O\*” (or “O?” for those questioned).

US VC					
Vintage year	Average IRR (%)	Median IRR (%)	Average TVPI	Initial category	Data reliable?
1981	Below av.	Below av.	1.4 to 2.1x	Medium	++
1982	Below av.	Below av.	1.4 to 2.1x	Medium	++
1983	Below av.	Below av.	1.4 to 2.1x	Medium	++
1984	Below av.	Below av.	1.4 to 2.1x	Medium	++
1985	Below av.	Below av.	1.4 to 2.1x	Medium	++
1986	Below av.	Below av.	1.4 to 2.1x	Medium	+
1987	Below av.	Below av.	1.4 to 2.1x	Medium	++
1988	Below av.	Below av.	1.4 to 2.1x	Medium	++
1989	Below av.	Below av.	1.4 to 2.1x	Medium	++
1990	Above av.	Above av.	2.2 to 2.5x	High (O?)	++
1991	Above av.	Below av.	1.4 to 2.1x	Medium (O*)	+
1992	Above av.	Above av.	2.6 to 4.4x	Very High	++
1993	Above av.	Above av.	2.6 to 4.4x	Very High	++
1994	Above av.	Above av.	2.6 to 4.4x	Very High	+
1995	Above av.	Above av.	2.6 to 4.4x	Very High	++
1996	Above av.	Above av.	2.6 to 4.4x	Very High	++
1997	Above av.	Above av.	2.6 to 4.4x	Very High	++
1998	Above av.	Below av.	1.4 to 2.1x	Medium (O*)	++
1999	Negative av.	Negative av.	Inf. to 1.2	Low	++
2000	Negative av.	Negative av.	Inf. to 1.2	Low	++
2001	Below av.	Below av.	Inf. to 1.2	Low (O?)	++

US LBO					
Vintage year	Average IRR (%)	Median IRR (%)	Average TVPI	Initial category	Data reliable?
1981	-	-	-	-	-
1982	-	-	-	-	-
1983	-	-	-	-	-
1984	Above av.	Above av.	2.8 to 3.6x	Very high	+
1985	Above av.	Above av.	2.8 to 3.6x	Very high	++
1986	Above av.	Above av.	2.8 to 3.6x	Very high	++
1987	Below av.	Below av.	1.8 to 2.0x	Medium (O*)	-
1988	Below av.	Below av.	1.8 to 2.0x	Medium	++
1989	Below av.	Above av.	2.0 to 2.8x	High (O*)	++
1990	Below av.	Below av.	1.2 to 1.7x	Low	++
1991	Above av.	Above av.	2.0 to 2.8x	High	++
1992	Above av.	Above av.	2.0 to 2.8x	High	++
1993	Above av.	Above av.	2.0 to 2.8x	High	-
1994	Below av.	Below av.	1.8 to 2.0	Medium	++
1995	Below av.	Below av.	1.8 to 2.0	Medium	-
1996	Below av.	Below av.	1.2 to 1.7	Low	++
1997	Below av.	Below av.	1.2 to 1.7	Low	++
1998	Below av.	Below av.	1.2 to 1.7	Low	++
1999	Below av.	Below av.	1.2 to 1.7	Low	++
2000	Below av.	Below av.	1.8 to 2.0	Medium	+
2001	Below av.	Below av.	1.2 to 1.7	Medium (O*)	+

EMEA VC					
Vintage year	Average IRR (%)	Median IRR (%)	Average TVPI	Initial category	Data reliable?
1981	Above av.	Above av.	1.6 to 1.9x	High	+
1982	-	-	-	-	-
1983	Above av.	Above av.	1.9 to 2.5x	High (O*)	++
1984	Above av.	Above av.	1.6 to 1.9x	High	+
1985	Below av.	Above av.	1.3 to 1.6x	Medium (O*)	++
1986	Above av.	Above av.	1.3 to 1.6x	High (O*)	++
1987	Below av.	Below av.	1.3 to 1.6x	Medium	++
1988	Below av.	Below av.	0.9 to 1.3x	Low	++
1989	Below av.	Above av.	1.6 to 1.9x	High (O*)	++
1990	Above av.	Above av.	1.9 to 2.5x	Very High	++
1991	Below av.	Below av.	1.3 to 1.6x	Medium	++
1992	Above av.	Above av.	1.9 to 2.5x	Very High	-
1993	Below av.	Below av.	1.3 to 1.6x	Medium	++
1994	Above av.	Above av.	1.6 to 1.9x	Very High (O*)	+
1995	Below av.	Below av.	0.9 to 1.3x	Low	++
1996	Above av.	Above av.	2.0 to 2.5x	Very High	++
1997	Above av.	Below av.	1.6 to 1.9x	High (O*)	+
1998	Above av.	Negative av.	1.3 to 1.6x	Medium (O*)	++
1999	Below av.	Negative av.	0.9 to 1.3x	Low	+
2000	Negative av.	Negative av.	0.9 to 1.3x	Low	++
2001	Negative av.	Negative av.	0.9 to 1.3x	Low	+

EMEA LBO					
Vintage year	Average IRR (%)	Median IRR (%)	Average TVPI	Initial category	Data reliable?
1981	-	-	-	-	-
1982	-	-	-	-	-
1983	-	-	-	-	-
1984	Above av.	Above av.	2.2 to 2.7x	High (O*)	+
1985	-	-	-	-	-
1986	Above av.	Below av.	1.8 to 2.2x	High (O*)	-
1987	Below av.	Below av.	1.4 to 1.8x	Medium	++
1988	Below av.	Below av.	1.4 to 1.8x	Medium	-
1989	Below av.	Below av.	1.3 to 1.4x	Low	++
1990	Below av.	Below av.	1.3 to 1.4x	Low	-
1991	Below av.	Below av.	1.4 to 1.8x	Medium	++
1992	Above av.	Above av.	1.8 to 2.2x	Very high	++
1993	Above av.	Below av.	1.8 to 2.7x	High (O*)	++
1994	Above av.	Above av.	1.8 to 2.2x	Very high (O*)	++
1995	Above av.	Below av.	1.8 to 2.2x	High (O*)	+
1996	Below av.	Below av.	1.4 to 1.8x	Medium	-
1997	Above av.	Below av.	1.5 to 1.8x	Medium (O*)	++
1998	Below av.	Below av.	1.4 to 1.8x	Medium (O*)	+
1999	Below av.	Above av.	1.4 to 1.8x	Medium (O*)	++
2000	Above av.	Above av.	2.2 to 2.7x	Very high	++
2001	Above av.	Above av.	1.8 to 2.7x	High	-

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Some outliers appear:

In US VC: “low” return VY have average and median IRRs below average and a TVPI that is lossmaking or below 1.2. “Medium” return VY have average and median IRRs below average and are profit making (TVPI between 1.4 and 2.1x). “High” return VY have average and median IRRs above average and are profit making (TVPI between 2.2 and 2.5x). “Very high” returns VY have average and median IRRs far above average and are profit making (TVPI between 2.6 and 4.4x).

- VY 1991 would belong to “medium” returns, but exhibits an above average median IRR.
- VY 1998 would belong to “medium” returns, but exhibits a high average IRR (25.1%).
- VY 1990 is not an outlier but the only VY in the “high” returns category (around the 1980-2001 average for Thomson). It is either a test case for the “medium” and “very high” categories, or will justify its own category.
- VY 2001 is not an outlier but the only VY generating positive results in the “low” returns category. It is a test case for the “low” and “medium” returns categories.

In US LBO: “low” return VY have average and median IRRs below average and a low TVPI (between 1.2 and 1.7x). “Medium” return VY have average and median IRRs below average and are profit making (TVPI between 1.8 and 1.99x). “High” return VY have average and median IRRs above average and are profit making (TVPI between 2.0 and 2.79x). “Very high” return VY have average and median IRRs far above average and are profit making (TVPI between 2.8 and 3.6x).

- VY 1987 appears as a below average vintage, except for the TVPI. It is assigned to the “medium” returns category, to be tested.
- VY 1989 is an outlier, as it ranks below average for IRRs but above average according to its TVPI. It is assigned to the “high” returns category, to be tested.
- VY 2001 appears as a below average vintage in terms of IRR (though very close to the average) and TVPI and would theoretically qualify for a “low” returns category. However, it is quite far in terms of performance from other vintages. It is assigned to the “medium” returns category, to be tested.

In EMEA VC: “low” return VY have average and median IRRs below average and a loss-making TVPI or up to 1.3. “Medium” return VY have average and median IRRs below average and are profit making (TVPI between 1.3 and 1.6). “High” return VY have average and median IRRs above average and are profit making (TVPI between 1.6 and 1.89). “Very high” return VY have average and median IRRs far above average and are profit making (TVPI between 1.9 and 2.5).

- VY 1983 is singled out by its very high TVPI (“very high” returns) and IRRs assigning it to “high” returns. It is assigned to “high” returns, to be tested.
- VY 1985 is singled out by its median IRR slightly above the 1984-2001 average. It is assigned to “medium” returns, to be tested.
- VY 1986 is singled out by its TVPI, which is slightly below the 1981-2001 average. It is assigned to “high” returns, to be tested.

- VY 1989 is above the 1981-2001 average for its median IRR and its TVPI, but below for its average IRR. It is assigned to “high” returns, to be tested.
- VY 1997 is above the 1981-2001 average for its average IRR and its TVPI, but below for its median IRR. It is assigned to “high” returns, to be tested.
- VY 1998 is an outlier as its average IRR is above the 1984-2001 bar (high returns), but its median IRR is negative (low returns) and its TVPI is below average (low returns). It is assigned to “medium” returns, to be tested.

In EMEA LBO: “low” return VY have average and median IRRs below average and TVPI below 1.4x. “Medium” return VY have average and median IRRs below average and are profit making (TVPI between 1.4 and 1.79x). “High” return VY have average and median IRRs above average and are profit making (TVPI between 1.8 and 2.19x). “Very high” return VY have average and median IRRs far above average and are profit making (TVPI between 2.2 and 2.7x).

- VY 1984 shows a very high TVPI but IRRs close to the average. It is assigned to “high” returns, to be tested.
- VYs 1986, 1993 and 1995 are singled out as their median IRR are below the average, but their TVPI and average IRR are well above (VY 1993’s TVPI is exactly at the average). They are assigned to “high” returns, to be tested.
- VY 1997 exhibits a high average IRR but its median IRR is low and its TVPI slightly below average. It is assigned to “medium” returns, to be tested.
- VY 1998 exhibits low IRRs, but a TVPI in the “medium” range. It is assigned to “medium” returns, to be tested.
- VY 1999 has a median average that is above average, but its average IRR and TVPI are slightly below. It is assigned to “medium” returns, to be tested.

While gathering data, the quality of the output varied. A score was assigned to it.

### *Data processing and methodology*

Based on the four categories above, the first step was to create our “ideal-types” profiles of cash-flows by aggregating J-curves of fully realized PEFs. The resulting statistical patterns will be used to benchmark actual and future funds. These cash-flows are boom/bust agnostic (they are not influenced by the Internet boom/bust for VC, nor the 2004-2008 boom for LBO); they are by definition normalized, as they aggregate each vintage year’s J-curves with the same weight (i.e., regardless the amounts invested and distributed).

We then analyzed the four ideal-types identified and their usefulness as a predictor of this performance. Correlation tests have been used to qualify the ideal-types, identify representative vintages and challenge the outliers identified.

#### First step: data retrieval

From the PE section of Thomson ONE we have retrieved the quarterly cash-flows (“cash-flow summary”) of VC and LBO funds in USA and EMEA (all flows are retrieved in USD), for all funds in each separate VY available through 2009 (after that date funds are not mature enough to provide meaningful cash-flows). The operation was repeated to filter out the top quartile funds (some VY do not count three funds or more and are hence unavailable). Thomson provides sample sizes, funds capitalization (cumulated fund size of the sample), takedowns (capital calls) and total distributions. Quarterly “cumulative returns” from

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inception were then retrieved, providing IRRs (average, capital weighted average, pooled average) calculated by Thomson (used only to cross-check our own IRR calculations).

### Second step: sorting data

Exhibit 2 provides the average net performance from Thomson: sample size, capital-weighted average IRR and the capital-weighted average TVPI. This breakdown has been done for each VY for US VC (1981-2009) and LBO (1984-2009), and EMEA VC (1981-2009) and LBO (1984-2009). The operation was repeated for top quartile funds (unreported). Realized funds (up to 2001) have been separated from the unrealized funds (2002-2009).

### Third step: data aggregation in fund categories (ideal-types) and graphical illustration

Each VY is then allocated to one of the four categories identified above. An average cash-flow curve for each category has been generated as well as another for the overall realized sample. These operations were then repeated for top quartile funds. Graphical illustrations (after computing data on a basis 100) have been generated with cumulated distributions, cumulated takedowns and cumulated DPI to illustrate the “J-curve” phenomenon, for the overall sample, then for each “ideal-type” and for each of the partially unrealized vintage years. Graphical illustrations are reported as Exhibits 6 and 7 for US venture capital funds (first with the average and the different categories, then with the average, a low returns scenario – as a matter of illustration - and the unrealized vintages); Exhibits 8 and 9 for US LBO funds (first with the average and the different categories, then with the average, a medium returns scenario – as a matter of illustration - and the unrealized vintages); Exhibits 10 and 11 for EMEA venture capital funds (first with the average and the different categories, then with the average, a low returns scenario – as a matter of illustration - and the unrealized vintages); Exhibits 12 and 13 for EMEA LBO funds (first with the average and the different categories, then with the average, a very high returns scenario – as a matter of illustration - and the unrealized vintages). Atypical behaviors, which could affect results, have been duly noted (see below).

### Fourth step: determining the potential predictive power of the J-curve of performances

A correlation table for average and top quartile funds was then set. These correlations are based on the cash-flows (J-curves) for the average 1980-2001, the different ideal-types and for each vintage (including those beyond 2001). Results are presented in Exhibit 4 to 7 for average funds.

Though often criticized, correlation tests are in this case the most effective tool to use: directionality is not a matter of discussion, correlation tests are robust and not sensitive to high variability in the quality of input data (some of the cash-flows provided by Thomson are incomplete). More sophisticated econometric techniques would be richer, assuming that accessible input data would be as well. As this is not the case (no information on the size of funds or industry focus or any additional data is provided along performance data is provided by Thomson), we directly accounted for the region of origin and investment strategy.

To test in-sample and out-of-sample periods, we ran correlations (unreported) with the VY 1985 of US VC funds paired with average US VC funds aggregated or by vintage (excluding VY 1985 from the paired data). The purpose was to identify its representativeness as the “medium” return “idea-type”, and to test it with fully realized and partially unrealized funds. The test was run with top quartile funds and bottom quartile funds of the VY 1985. The same reasoning was applied to VY 1990 (“high” performance scenario) for average, top and

bottom quartile US VC funds; with VY 1995 (“very high” performance<sup>9</sup>); and VY 2000 (“low” performance).

Exhibit 17 sums up the findings, and applies the predictive performance model to unrealized funds aggregated by VYs.

Fifth step: assessment of the reliability of the J-Curves to predict future performances

The last step was to determine when the correlations start to have a predictive role and to assess how reliable these predictions can be. We tested whether the “ideal-type” assessment of the final quarter of each year (Exhibit 18) reflects the final performance for each VY, in each strategy and in each geographical area. We then assessed the spread with the closest category of return, first if the end of quarter performance matched with the final performance, and then if it did not. This step replaced the usual concept of confidence intervals and provided probabilities which match the value-at-risk framework employed by the solvency and prudential ratio calculation.

## ANALYSIS AND FINDINGS

### *Analysis of the paid-in to committed capital (PIC) ratios*

Calculations and analysis on (Exhibits 4 and 5) are based on:

- 1073 realized US VC funds (VYs 1981-2001), representing USD 181.7 bil. committed and 164.4 bil. paid-in. The net PIC is 0.90. The average fund size is 169.3 mil. (from a minimum average size of 33.4 mil. in 1981 to 470.6 mil. in 2001). This average fund size increases to USD 197.6 mil. if we include the funds of VYs 2002-2009 (leading to a total of 1265 funds, 249.9 bil. committed, 213.9 bil. paid-in).
- 425 realized US LBO funds (VYs 1984-2001), representing USD 292.2 bil. committed and 266.8 bil. paid-in. The net PIC is 0.91. The average fund size is 687.7 mil. (min: 171.5 mil. in 1985, max: 1161.5 mil. in 2001). Average fund size increases to USD 1174.6 mil. when we include VYs 2002-2009 (626 funds, 735.3 bil. committed, 612.1 bil. paid-in).
- 447 realized EMEA VC funds (VYs 1981-2001), representing USD 29.1 bil. committed and 22.7 bil. paid-in. The net PIC is 0.78. The average fund size is 65.2 mil. (min: 15.6 mil. in 1981, max: 99.3 mil. in 2000). The average fund size increases to USD 69.7 mil. when we include VYs 2002-2009 (789 funds, 54.9 bil. committed, 41.5 bil. paid-in).
- 269 realized EMEA LBO funds (VYs 1984-2001), representing USD 88.9 bil. committed and 77.6 bil. paid-in. The net PIC is 0.87. The average fund size is 330.4 million (min: 16.0 mil. in 1984, max: 809.9 mil. in 2001). The average fund size increases to USD 691.0 mil. when VYs 2002-2009 (471 funds, 249.9 bil. committed, 213.9 bil. paid-in) are included.

The comparatively small number of EMEA funds accounted for necessitates a certain caution in our analysis and conclusions. Significant differences appear between the US and EMEA funds. The first is the PIC difference for VC (0.90 net in the US, 0.78 in EMEA): either because of different fund covenants or because of longer investment periods, EMEA VC funds have a lower PIC. This might explain their lower performances as compared with US

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<sup>9</sup> 1996 and 1997 could qualify as well: their correlations are lower with the “Very High” returns category (0.93) but more distinctive with other return categories.

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funds, which have a more active reinvestment policy of early proceeds<sup>10</sup>. US and EMEA LBO funds have rather similar PIC. The second difference lies in fund sizes: US average fund sizes are more than double that of EMEAs. The relative weight of fixed costs is higher for EMEA funds so a proportion of EMEA funds may not be economically viable.

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<sup>10</sup> Venture capital funds are allowed to reinvest in their portfolio companies even after the end of the investment period.

14<sup>th</sup> FRAP  
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Exhibit 4. Net paid-in to committed ratios for US VC and LBO funds (1981-2001 and 1984-2001) and EMEA VC and LBO funds (1992-2001)

This table provides the committed capital, average fund sizes, paid-in and paid-in/committed (PIC) ratio for US VC and LBO funds; and EMEA VC and LBO funds from Thomson ONE Banker database (1981-2009).

	US Venture Capital					US LBO					EMEA Venture Capital					EMEA LBO					
	Vintage year	Sample	Total committed	Average fund size	Paid-in	PI/C (net)	Sample	Total committed	Average fund size	Paid-in	PI/C (net)	Sample	Total committed	Average fund size	Paid-in	PI/C (net)	Sample	Total committed	Average fund size	Paid-in	PI/C (net)
Fully realized*	1981	21	701.44	33.40	690.47	0.98	-	-	-	-	-	3	46.78	15.59	26.16	0.56	-	-	-	-	-
	1982	28	1119.72	39.99	963.48	0.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1983	58	2 521.04	43.47	2 405.00	0.95	-	-	-	-	-	4	88.55	22.14	84.11	0.95	-	-	-	-	-
	1984	63	2 553.13	40.53	2 397.38	0.94	7	1 662.43	237.49	1 660.00	1.00	6	152.37	25.39	114.38	0.75	4	64.04	16.01	38.86	0.61
	1985	46	1 441.36	31.33	1 390.30	0.96	8	1 372.09	171.51	1 285.25	0.94	16	402.49	25.16	323.81	0.80	-	-	-	-	-
	1986	38	2 621.64	68.99	2 505.89	0.96	10	1 876.57	187.66	1 750.44	0.93	10	250.23	25.02	227.24	0.91	5	176.08	35.22	178.25	1.01
	1987	64	2 816.49	44.01	2 710.84	0.96	24	12 454.11	518.92	13 306.89	1.07	8	477.29	59.66	458.68	0.96	7	416.29	58.47	402.44	0.97
	1988	45	2 400.35	53.34	2 318.40	0.97	16	8 448.70	528.04	8 156.23	0.97	11	556.22	50.57	499.45	0.90	15	1 878.17	125.21	859.24	0.46
	1989	50	3 989.77	78.95	3 891.16	0.98	25	5 628.12	335.12	5 274.41	0.90	20	780.17	39.01	688.32	0.88	10	2 155.84	215.58	1 803.48	0.84
	1990	23	1 433.08	62.31	1 299.16	0.91	10	2 652.26	265.23	2 401.37	0.91	14	673.91	48.14	624.48	0.93	12	2 067.93	172.33	2 359.01	1.14
	1991	17	836.28	49.19	838.54	1.00	5	1 439.98	288.00	1 292.66	0.90	11	484.27	44.02	422.19	0.87	15	1 204.21	80.28	1 114.01	0.93
	1992	28	2 488.25	88.86	2 438.39	0.98	14	4 378.17	312.73	4 171.24	0.95	6	193.76	62.29	211.48	1.09	7	799.96	114.28	654.46	0.82
	1993	41	3 234.06	78.88	2 949.31	0.91	20	9 688.50	484.42	10 017.64	1.03	11	294.34	26.76	280.14	0.95	8	874.44	109.31	695.95	0.80
	1994	36	4 660.01	129.44	4 427.88	0.95	25	10 855.95	434.24	9 831.23	0.91	16	689.52	43.09	476.45	0.69	14	2 789.64	199.26	2 411.51	0.86
	1995	48	4 594.92	95.72	4 205.92	0.92	25	18 913.27	756.53	19 033.33	1.01	13	1 280.91	98.53	1 055.00	0.82	11	1 917.14	174.29	1 398.64	0.73
	1996	38	4 988.69	131.28	4 671.07	0.94	25	11 451.85	458.07	11 077.51	0.97	18	749.92	41.66	599.63	0.80	18	6 510.89	361.72	3 765.82	0.58
	1997	61	9 426.45	154.53	8 868.91	0.94	40	32 537.01	813.43	31 653.02	0.97	35	1 722.36	49.21	1 290.63	0.75	26	10 567.48	406.44	9 220.75	0.87
	1998	80	18 606.36	232.58	17 158.86	0.92	55	54 065.35	978.99	50 014.37	0.93	33	2 367.35	71.74	2 178.28	0.92	25	13 726.14	549.04	10 490.83	0.76
	1999	106	32 793.82	309.37	29 684.69	0.91	38	30 638.44	806.27	27 561.62	0.90	57	3 785.90	66.42	2 214.46	0.58	36	11 550.83	320.86	11 325.81	0.98
	2000	122	50 267.59	412.03	43 065.30	0.86	51	53 778.32	1 054.47	51 075.29	0.76	93	9 238.53	99.34	7 500.55	0.81	35	15 166.83	433.34	13 743.23	0.91
	2001	60	28 234.16	470.57	25 514.20	0.90	27	31 359.25	1 161.45	27 303.40	0.87	62	4 893.96	78.93	3 413.11	0.70	21	17 007.99	809.90	17 156.29	1.01
Active	2002	19	4 531.11	238.48	3 030.98	0.67	19	17 448.74	918.35	15 289.60	0.88	34	931.56	27.40	867.97	0.93	23	9 865.95	428.95	9 809.75	0.99
	2003	21	5 177.48	246.55	4 864.27	0.94	17	20 669.31	1 215.84	19 633.17	0.95	41	2 549.62	62.19	2 245.47	0.88	19	8 505.63	447.66	6 844.40	0.80
	2004	28	9 256.61	330.59	7 907.48	0.85	21	21 407.18	1 019.39	18 262.24	0.85	45	2 616.93	58.15	2 142.14	0.82	18	16 066.74	892.60	12 520.40	0.78
	2005	23	6 829.59	296.94	4 795.89	0.70	33	50 379.02	1 526.64	45 943.77	0.91	38	3 295.32	86.72	2 675.88	0.81	34	47 455.08	1 395.74	48 257.95	1.02
	2006	44	25 174.61	572.15	19 618.60	0.78	35	114 324.79	3 266.42	109 205.67	0.96	39	6 566.79	168.38	4 365.75	0.66	38	49 269.89	1 296.58	40 493.83	0.82
	2007	24	6 174.40	257.26	4 002.40	0.65	37	121 534.01	3 284.70	86 226.24	0.71	54	5 937.23	109.95	4 439.83	0.75	31	44 708.86	1 444.80	34 162.80	0.76
	2008	20	7 572.94	378.65	3 747.58	0.49	29	73 481.07	2 637.27	38 743.69	0.51	55	3 070.35	54.37	1 619.31	0.53	26	47 046.15	1 809.47	24 355.05	0.52
	2009	13	3 495.83	268.91	1 601.26	0.46	10	20 757.54	2 075.75	11 943.46	0.58	36	866.94	24.08	511.51	0.59	13	13 592.36	1 045.56	4 398.47	0.32
Total realiz.	1073	181 698		164 394		425	292 281		266 865		447	29 127		22 688		269	88 873		77 618		
Av. realiz.			169.33		0.90			687.72		0.91			65.16		0.78			330.38		0.87	
Total all	1265	249 911		213 963		626	735 283		612 113		789	54 962		41 556		471	325 464		258 461		
Av. all			197.56		0.86			1174.57		0.83			69.66		0.76			691.01		0.79	

\* Vintage years 2001, though having reached their 10-year lifespan, might still be active and under life extension periods.

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Exhibit 5. Net paid-in to committed ratios, for top quartile US VC and LBO funds (1981-2001 and 1986-2001), and EMEA VC and LBO funds (1993-2001)

This table provides the committed capital, average fund sizes, paid-in and paid-in/committed (PIC) ratio for top quartile US VC and LBO funds; and EMEA VC and LBO funds from Thomson ONE Banker database (1981-2009).

	US Venture Capital					US LBO					EMEA Venture Capital					EMEA LBO					
Vintage year	Sample	Total committed	Average fund size	Paid-in	P/I/C (net)	Sample	Total committed	Average fund size	Paid-in	P/I/C (net)	Sample	Total committed	Average fund size	Paid-in	P/I/C (net)	Sample	Total committed	Average fund size	Paid-in	P/I/C (net)	
Fully realized*	1981	6	335.52	55.92	356.64	1.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1982	7	341.78	48.82	313.38	0.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1983	15	735.77	49.05	719.24	0.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1984	16	729.80	45.61	658.87	0.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1985	12	341.77	24.48	341.81	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1986	10	1592.24	159.22	1498.80	0.94	3	957.20	319.07	765.15	0.80	-	-	-	-	-	-	-	-	-	
	1987	16	1078.08	67.38	1022.15	0.95	7	3 371.55	481.65	3 564.26	1.06	-	-	-	-	-	-	-	-	-	
	1988	12	1294.87	107.91	1247.77	0.96	5	2 170.40	434.08	2 162.13	1.00	-	-	-	-	-	-	-	-	-	
	1989	13	723.48	55.65	706.17	0.98	7	2 578.35	368.34	1 802.71	0.70	-	-	-	-	-	-	-	-	-	
	1990	6	551.32	91.88	532.14	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1991	4	200.16	50.04	202.04	1.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1992	7	865.05	123.58	806.48	0.93	4	1 486.53	371.63	1 469.58	0.99	-	-	-	-	-	-	-	-	-	
	1993	11	1 251.44	113.77	1 177.31	0.94	6	3 132.00	522.00	3 092.84	0.99	3	104.21	34.74	94.88	0.91	3	398.83	132.94	278.46	0.70
	1994	9	3 029.61	336.62	2 937.48	0.97	7	4 894.60	699.23	4 109.56	0.84	4	212.87	53.22	202.92	0.95	4	1 271.78	317.94	1 294.52	1.02
	1995	12	1 403.68	116.97	1 329.33	0.95	7	3 820.36	545.77	2 991.35	0.78	4	873.13	218.28	738.81	0.84	3	1 160.15	386.72	710.68	0.61
	1996	10	1 163.00	116.30	1 089.18	0.94	7	3 313.57	473.37	3 243.35	0.98	4	192.23	48.06	161.42	0.84	5	2 986.81	597.36	1 227.00	0.41
	1997	16	2 329.63	145.60	2 241.63	0.96	10	13 415.82	1 341.58	13 891.97	1.04	9	652.04	72.45	489.85	0.75	7	2 784.91	397.84	2 545.72	0.91
	1998	20	3 704.77	185.24	3 530.35	0.95	15	6 092.65	406.17	5 819.36	0.96	8	393.66	49.21	369.39	0.94	7	8 114.15	1 159.16	6 822.67	0.84
	1999	27	7 140.70	264.47	6 402.53	0.90	10	9 858.40	985.84	9 135.55	0.93	14	468.43	33.46	306.61	0.65	10	2 555.23	255.52	2 182.86	0.85
	2000	31	18 856.47	608.27	16 991.42	0.90	14	20 227.22	1 444.80	16 472.69	0.81	22	1 119.37	50.88	811.21	0.72	9	4 464.39	496.04	4 388.94	0.98
	2001	15	11 910.31	794.02	11 001.16	0.92	7	7 779.50	1 111.36	7 504.61	0.96	15	676.12	45.07	650.13	0.96	6	11 208.47	1 868.08	12 162.80	1.09
Active	2002	5	723.13	144.63	542.84	0.75	5	3 416.39	683.28	3 609.62	1.06	7	225.81	32.26	224.99	1.00	6	3 932.65	655.44	3 462.05	0.88
	2003	6	1 125.02	187.50	1 070.13	0.95	5	9 318.60	1 863.72	7 780.53	0.83	10	578.99	57.90	556.87	0.96	5	2 410.80	482.16	2 701.73	1.12
	2004	7	2 821.82	403.12	2 428.93	0.86	6	6 373.20	1 062.20	5 985.02	0.94	12	1 340.55	111.71	992.00	0.74	4	2 496.84	624.21	2 773.79	1.11
	2005	6	1 558.83	259.81	1 390.32	0.89	9	19 618.09	2 179.79	18 547.75	0.95	10	447.99	44.80	419.22	0.94	9	8 549.22	949.91	8 315.50	0.97
	2006	11	7 581.20	689.20	6 512.72	0.86	9	12 697.00	1 410.78	12 008.21	0.95	10	4 071.89	407.19	2 787.68	0.68	10	8 725.48	872.55	7 959.61	0.91
	2007	6	1 584.55	264.09	1 222.04	0.77	10	19 283.50	1 928.35	13 494.88	0.70	14	1 188.23	84.87	805.66	0.68	8	11 462.32	1 432.79	7 640.69	0.67
	2008	5	933.75	186.75	454.32	0.49	7	6 104.01	872.00	3 423.68	0.56	14	1 507.45	101.95	537.40	0.36	5	1 922.72	384.54	1 061.29	0.55
	2009	4	1 482.30	370.58	832.05	0.56	-	-	-	-	-	9	171.73	19.08	95.17	0.55	4	7 862.60	1 965.65	1 952.17	0.25
Total realiz. Av. realiz.	275	59 579		55 105		109	82 491		76 025		83	4 692		3 825		54	34 944		31 613		
Total all Av. all	325	77 390	216.65	69 559	0.92	160	159 301	756.80	140 874	0.92	169	14 224	56.53	10 244	0.82	105	82 307	647.12	67 480	0.90	
			238.12		0.90			995.64		0.88			84.17		0.72			783.88		0.82	

\* Vintage years 2001, though having reached their 10-year lifespan, might still be active and under life extension periods.

A look at the gross PIC helps to identify atypical behaviors of VYs (which might not be properly accounted for in terms of paid-in, hence introducing biases in our cash-flow analysis). Management fees have little chance to exceed 20% of the fund size. As a fund can only be invested up to 100%, net PICs should be between 0.8-1.0. US VC fits within these brackets<sup>11</sup> (average net PIC is 0.90 for realized funds and 0.86 for unrealized funds). This is consistent with Ljungvist and Richardson (2003) who found a 0.94 PIC over 1981-1992. US LBO 1987, 1993 and 1995 are above 1.0 while US LBO 2000 is at 0.7612. These vintages should be handled with caution. The average net PIC is 0.91 for realized funds and 0.83 (net for unrealized funds, consistent with Ljungvist and Richardson, 2003).

For EMEA, VC exhibits one VY above 1.0 (1992) and six below 0.8 (1981, 1984, 1994, 1997, 1999, 2001)<sup>13</sup>. LBO funds exhibit three vintages with a net PIC above 1.0 (1986, 1990 and 2001); and five vintages with a net PIC below 0.80 (1984, 1988, 1995, 1996, 1998)<sup>14</sup>. Though some of the VYs are to be taken with caution, there is no systematic bias of performance identifiable (out- or under-performance) with PIC above or below thresholds.

### *Graphical analysis of the J-Curves*

Following up on the categorization of returns, we drew the J-Curves of US VC funds for the average and four ideal-types (Exhibit 6), and then selected an ideal-type (low returns) and the current partially unrealized VYs (Exhibit 7). All flows were re-scaled on a basis 100 for that purpose. The operation was then repeated for US LBO funds (Exhibits 8 and 9), EMEA VC funds (Exhibits 10 and 11), EMEA LBO funds (Exhibits 12 and 13).

### *First predictor of performance: the time to break-even*

Looking at Exhibit 6, the five curves exhibit different shapes. The average curve (1980-2001) shows that the maximum cumulated draw-down is actually slightly more than 40% of the committed capital, and crosses the x-axis in Q2 Year 8. The maximum cumulated draw-down for the “very high” returns curve is 55% and the curve crosses the x-axis in Q3 Year 5. The maximum cumulated draw-down for the “high” returns curve is 60% and the curve crosses the x-axis in Q1 Year 7. The “medium” returns curve exhibits a cumulated draw-down of close to 75% and crosses the x-axis in Q4 Year 9. The “low” returns curve reaches an 80% draw-down and never recovers. These shapes are rather distinctive and signal that the cash-flows of performing and underperforming VYs differ significantly.

The best VYs are those that exhibit a faster recovery of the J-Curve and that cross the x-axis early. As seen, the “very high” returns curve bottoms in Year 4, the “high” returns curve crosses in Year 5, the “medium” returns curve crosses in Year 5 and the “low” returns curve bottoms in Year 8. That the best VYs are bottoming in Year 4 or 5 shows that the holding period of the assets is indeed lower than the expected five years and should be three to four

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11 For US VC top quartile funds, the net PIC of two vintages years (1981 and 1991) appear above 1.00. These two years have to be treated with caution.

12 For US LBO top quartile funds, the net PIC is below 0.8 for 1989 and 1995; and above 1.00 for 1987 and 1997.

13 For EMEA VC top quartile funds, the net PIC of three vintages falls below 0.8: 1997, 1999 and 2000.

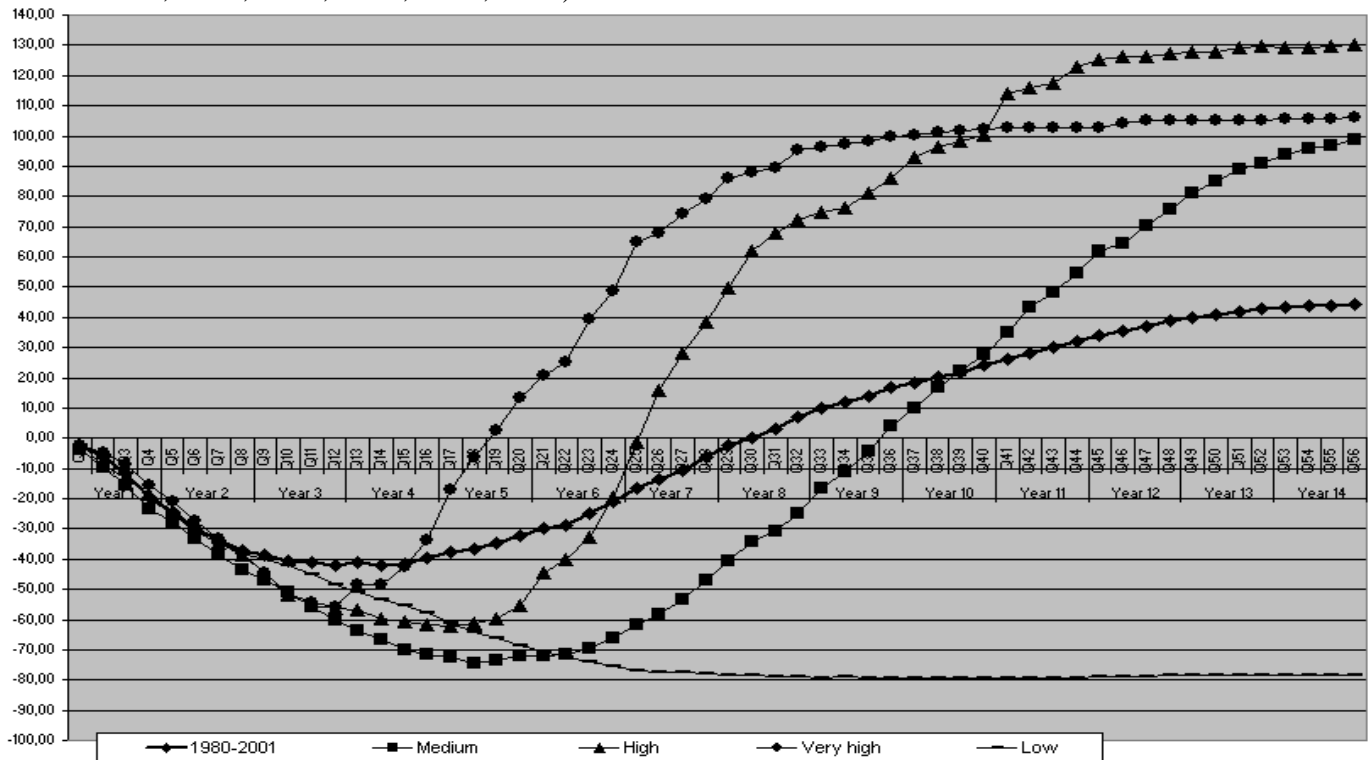
14 For EMEA LBO top quartile funds, the net PIC of three vintages falls below 0.8 (1993, 1995 and 1996) and two are above 1.00 (1994 and 2001).

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years. Being so distinct, these ideal-type curves could be a potential predictor for the returns of unrealized curves. We turn to Exhibit 7 to compare current VYs with the average and “low” returns curves. None of these curves actually crosses the x-axis. VYs 2002, 2003, 2004, 2005 and 2007 have bottomed respectively in Year 7 for the first four and Year 5 for 2007. Predicting the results by interpreting the graphical interpretation alone is rather difficult.

Exhibit 6. Cumulated cash-flows curves of US VC funds for the 1980-2001, medium, high, very high and low returns periods

The figure provides five cumulated cash-flow curves, based on data reported by Thomson ONE Banker15 (re-scaled on a basis 100), excluding outliers. Four ideal-types are identified: “high” returns (VYs 1980 and 1990), “medium” returns (VYs 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989), “low” returns (VYs 1999, 2000, 2001) and “very high” returns (VY 1992, 1993, 1994, 1995, 1996, 1997).

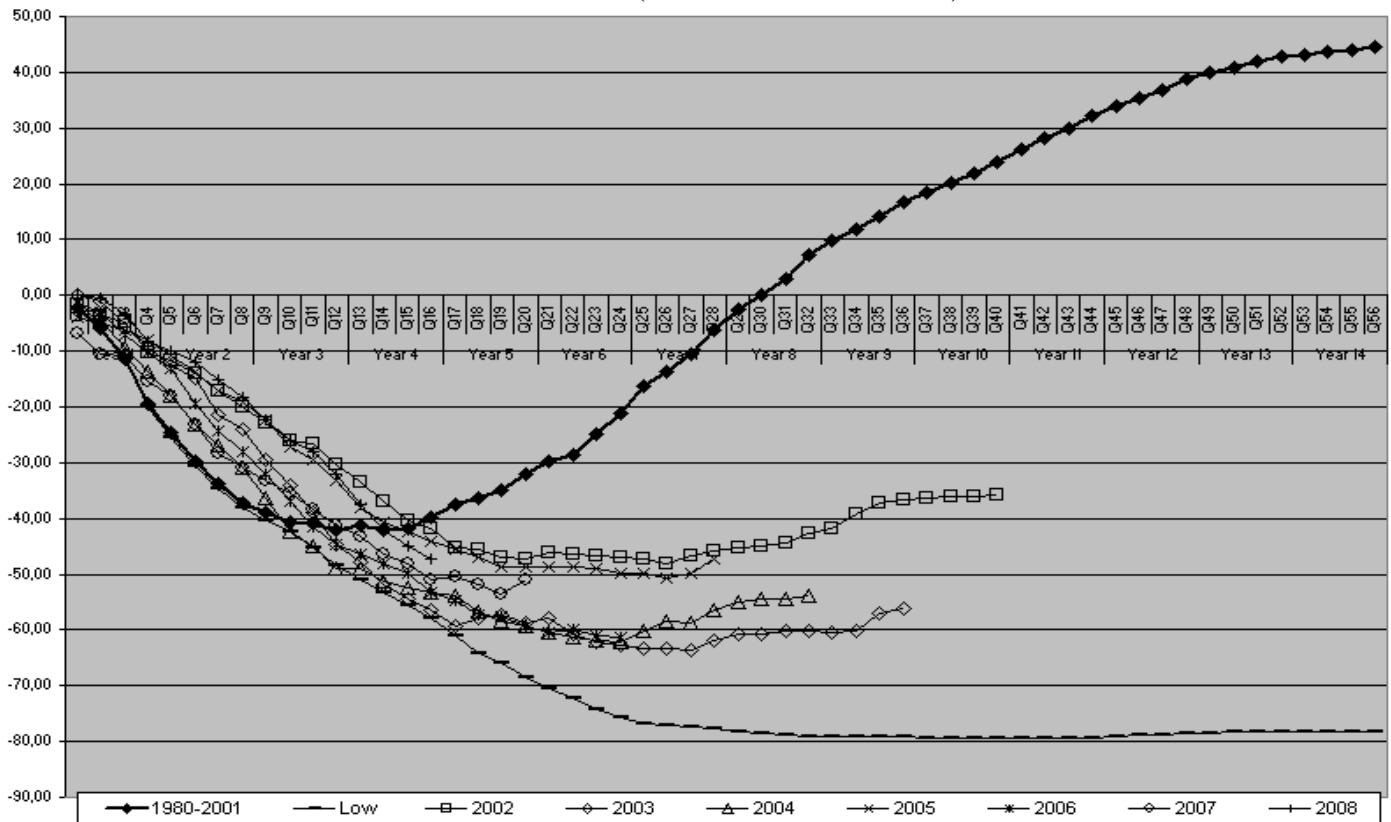


15 As of December 31, 2011.

## THE PREDICTIVE POWER OF THE J-CURVE

Exhibit 7. Cumulated cash-flows curves of US VC funds for the 1980-2001 and low returns periods; and years 2002, 2003, 2004, 2005, 2006, 2007 and 2008

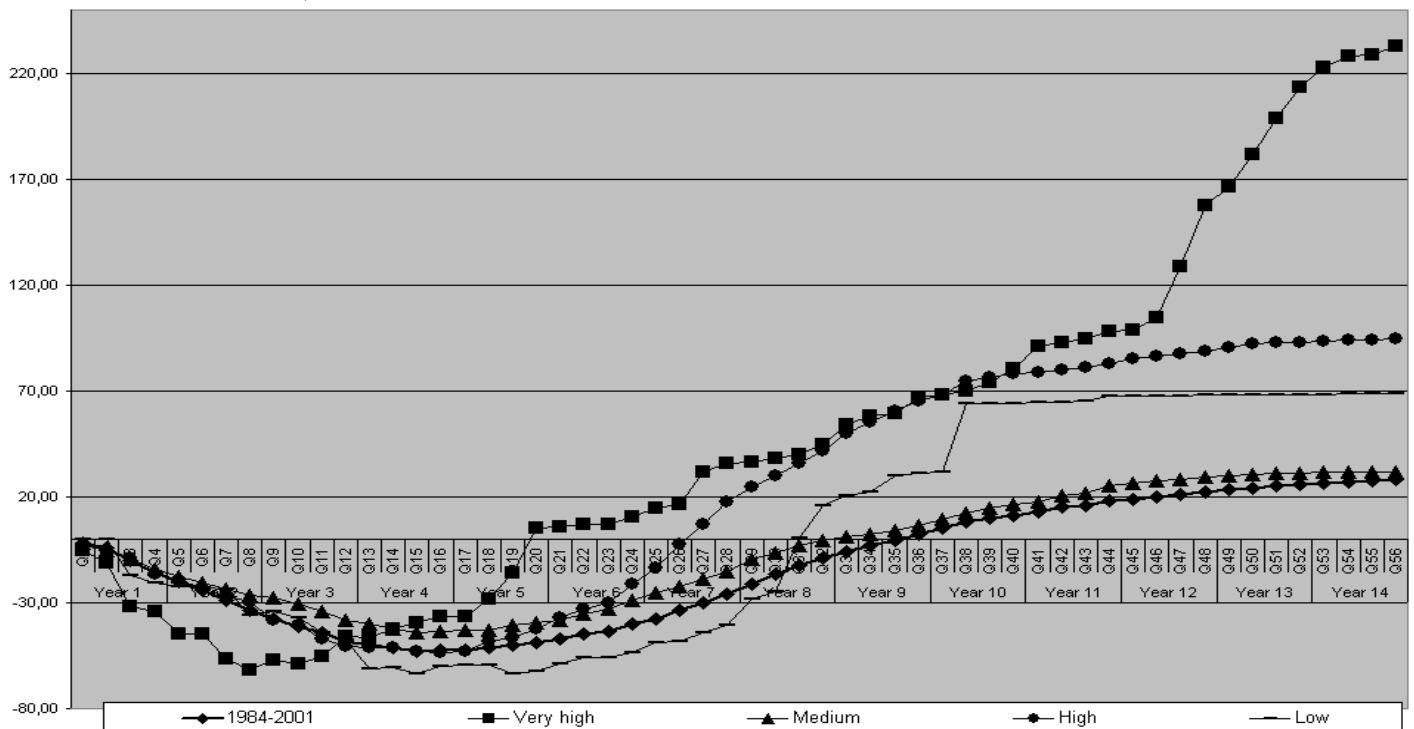
The figure provides nine cumulated cash-flow curves: the period 1980-2001, “low” returns (VYs 1990, 2000, 2001); active VYs 2002, 2003, 2004, 2005, 2006, 2007 and 2008, and is based on data from Thomson ONE Banker (re-scaled on a basis 100).



Looking at Exhibit 8, a few differences appear for US LBO. “Very high” returns and “Low” return curves bottom in the same region (slightly below -60%), while “High” returns bottom in the region of -55% and “Medium” returns at around -45%. Consistent with US VC, the shorter the time to cash-flow break-even, the better the performance is: Year 5 for “Very high” returns, Year 7 for “High”, Year 8 for “Medium” / “Low”.

Exhibit 8. Cumulated cash-flows curves of US LBO funds for the 1984-2001, very high, medium, high and low returns periods

The figure provides five cumulated cash-flow curves, based on data reported by Thomson ONE Banker16 (re-scaled on a basis 100), excluding outliers. Four ideal-types are identified: “high” returns (VYs 1989, 1991, 1992, 1993), “medium” returns (VYs 1988, 1994, 1995, 2000, 2001), “low” returns (VYs 1990, 1996, 1997, 1998, 1999) and “very high” returns (VY 1984, 1985, 1986).



*Ideal-type categories need to be adapted to each market*

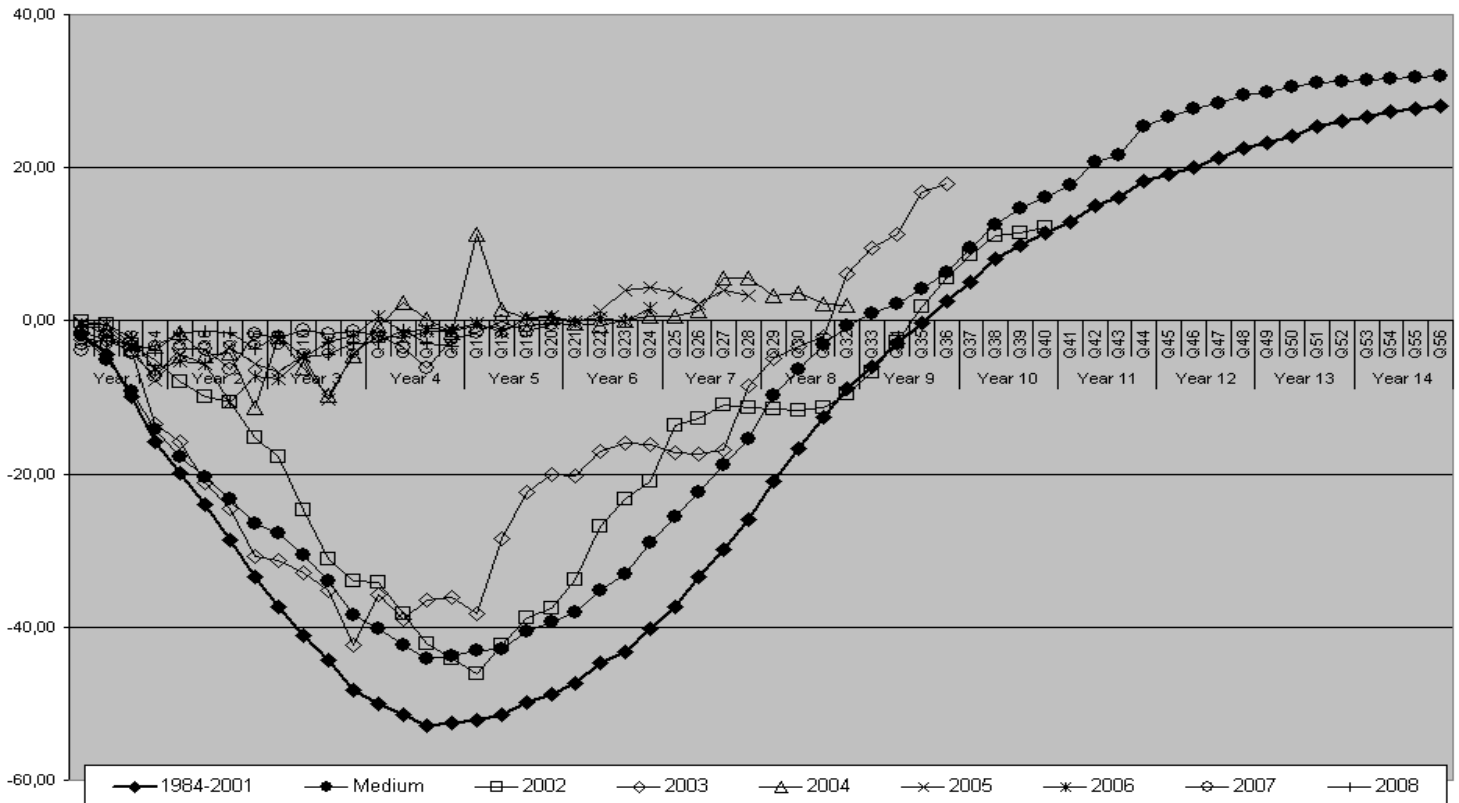
US LBO curves exhibit specific features, such as sudden recoveries of their cash-flows (for example, Q17 to Q20 and Q46 to Q48 for “Very High” returns; and Q37 to Q38 for “Low” returns). These might be related to refinancing opportunities (“dividend recaps”).

Interestingly, the shape of the “Low” returns J-Curve is closer to higher returns than to “Medium”. The performance of “Medium” being better than “Low”, this illustration belies the identification of a VY by simply reading the graphical interpretation. Turning to Exhibit 9, VYs 2002 and 2003 can be visually compared with the ideal-types, but other VYs are more difficult to compare.

## THE PREDICTIVE POWER OF THE J-CURVE

Exhibit 9. Cumulated cash-flows curves of US LBO funds for the periods 1984-2001 and medium returns period; and years 1990, 1996-1999, 2002, 2003, 2004, 2005, 2006, 2007 and 2008

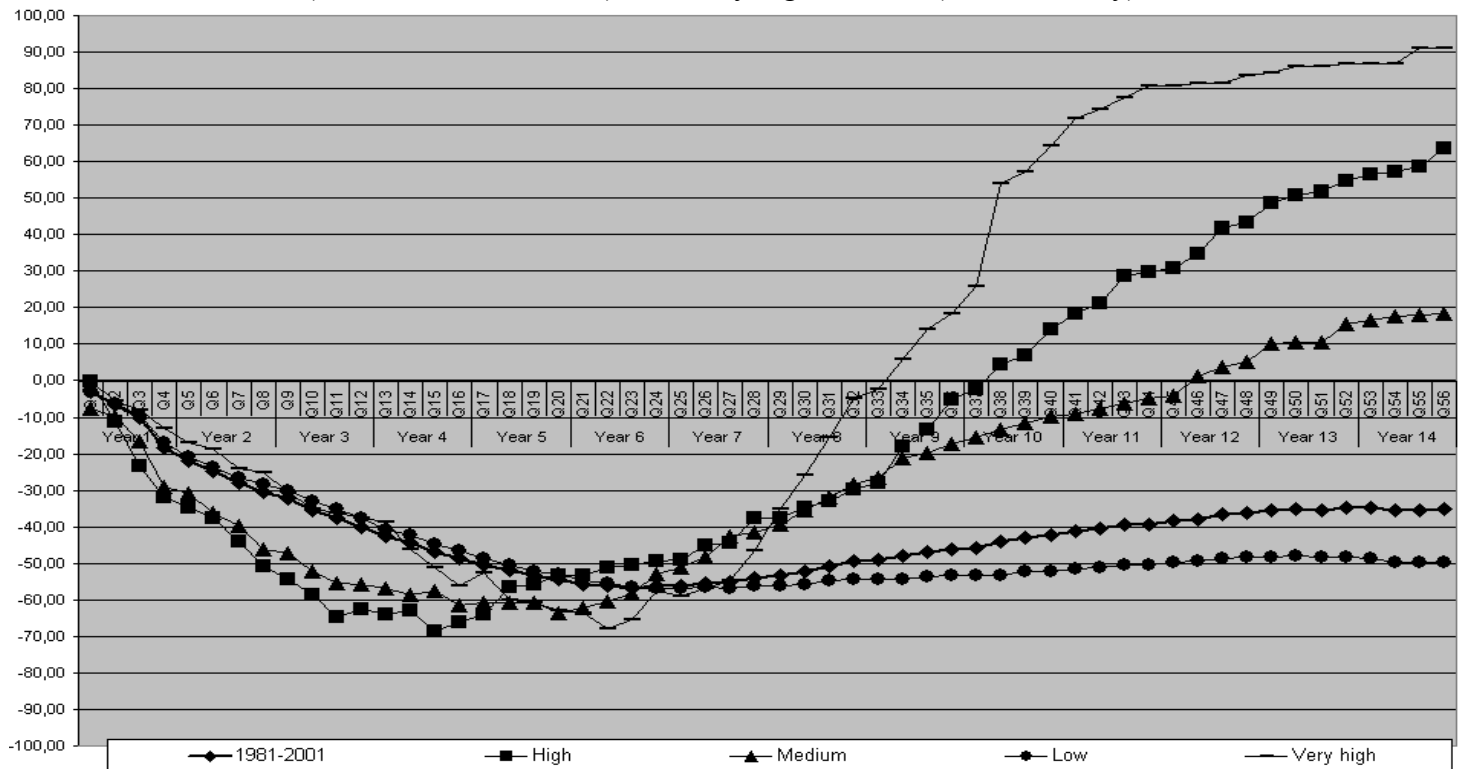
The figure provides nine cumulated cash-flow curves: the period “1984-2001”, “low” returns (VYs 1990, 1996, 1997, 1998, 1999), active VYs 2002, 2003, 2004, 2005, 2006, 2007 and 2008, and is based on data from Thomson ONE Banker (re-scaled on a basis 100).



EMEA VC funds curves (Exhibit 10) are another challenge: given the high number of outliers and the limited number of available VYs, some curve shapes (such as “very high” returns) are based on only one VY (1990 in that case). Ideal-types curves might have to be broken down differently in EMEA (in three or five categories). In EMEA, the earliest that the J-Curve crosses the x-axis is in Year 9 (“Very high” returns). “High” returns cross the axis in Year 10 only, while the “Medium” returns J-Curve crosses the x-axis in Year 12. Surprisingly, “very high” and “high” returns are the curves reaching the lowest points in terms of cumulated draw downs (70%). “Medium” returns reach –65% and the “Low” returns stop at –55%. Hence EMEA VC funds exhibit specific cash-flow shapes. Exhibit 11 hints at a possibly good performance of VY 2002, as well as 2003 and 2005.

Exhibit 10. Cumulated cash-flows curves of EMEA VC funds for 1981-2001, high, medium, low and very high returns periods

The figure provides five cumulated cash-flow curves, based on data reported by Thomson ONE Banker<sup>17</sup> (re-scaled on a basis 100), excluding outliers. Four ideal types are identified: “high” returns (VYs 1983, 1984 and 1986), “medium” returns (VYs 1985, 1987, 1991, 1993), “low” returns (VYs 1995, 2000, 2001) and “very high” returns (VY 1990 only).

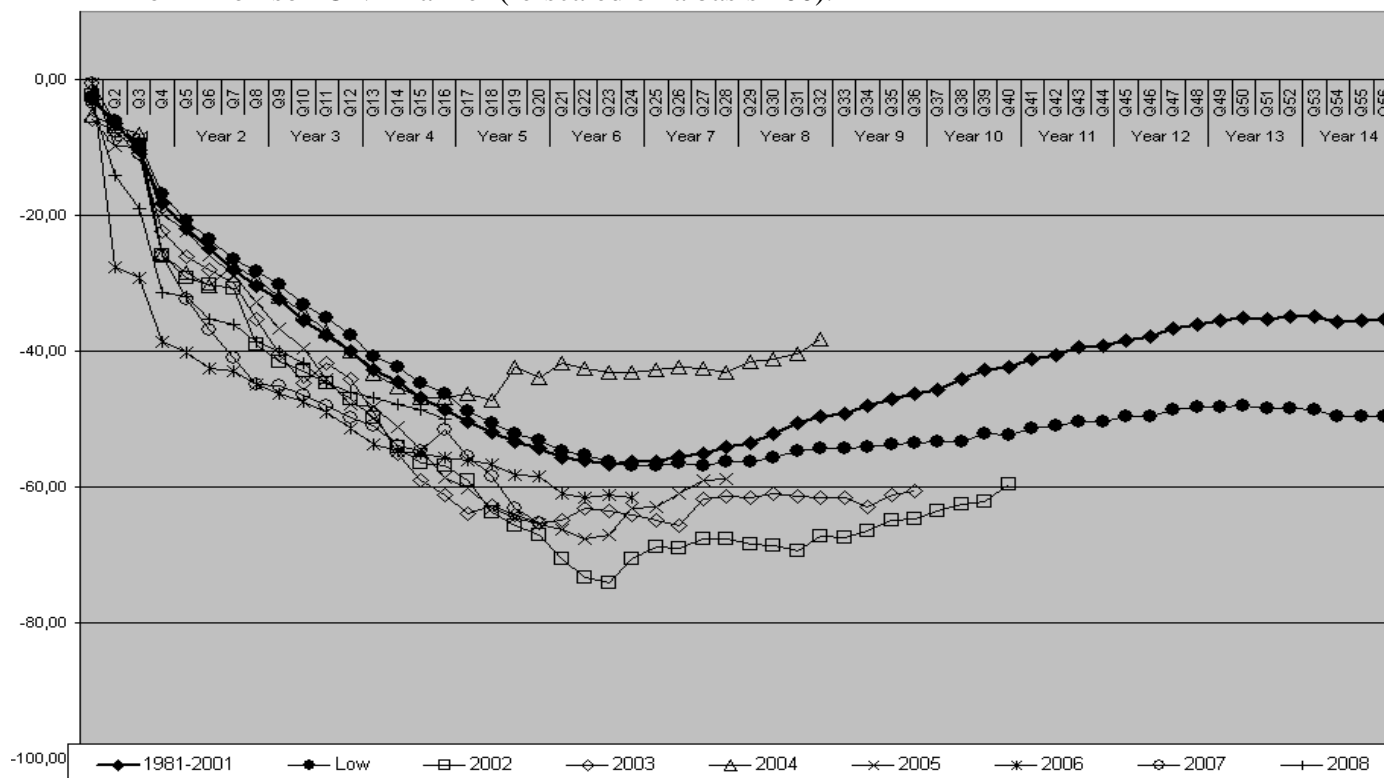


<sup>17</sup> As of December 31, 2011.

## THE PREDICTIVE POWER OF THE J-CURVE

Exhibit 11. Cumulated cash-flows curves of EMEA VC funds for 1981-2001, the low returns period and the years 2002, 2003, 2004, 2005, 2006, 2007 and 2008

The figure provides nine cumulated cash-flow curves: the period “1981-2001” (VYs 1983, 1984, 1985, 1986, 1987, 1990, 1991, 1993, 1995, 2000 and 2001), “low” returns (VYs 1995, 2000, 2001), and active VYs 2002, 2003, 2004, 2005, 2006, 2007 and 2008, based on data from Thomson ONE Banker (re-scaled on a basis 100).

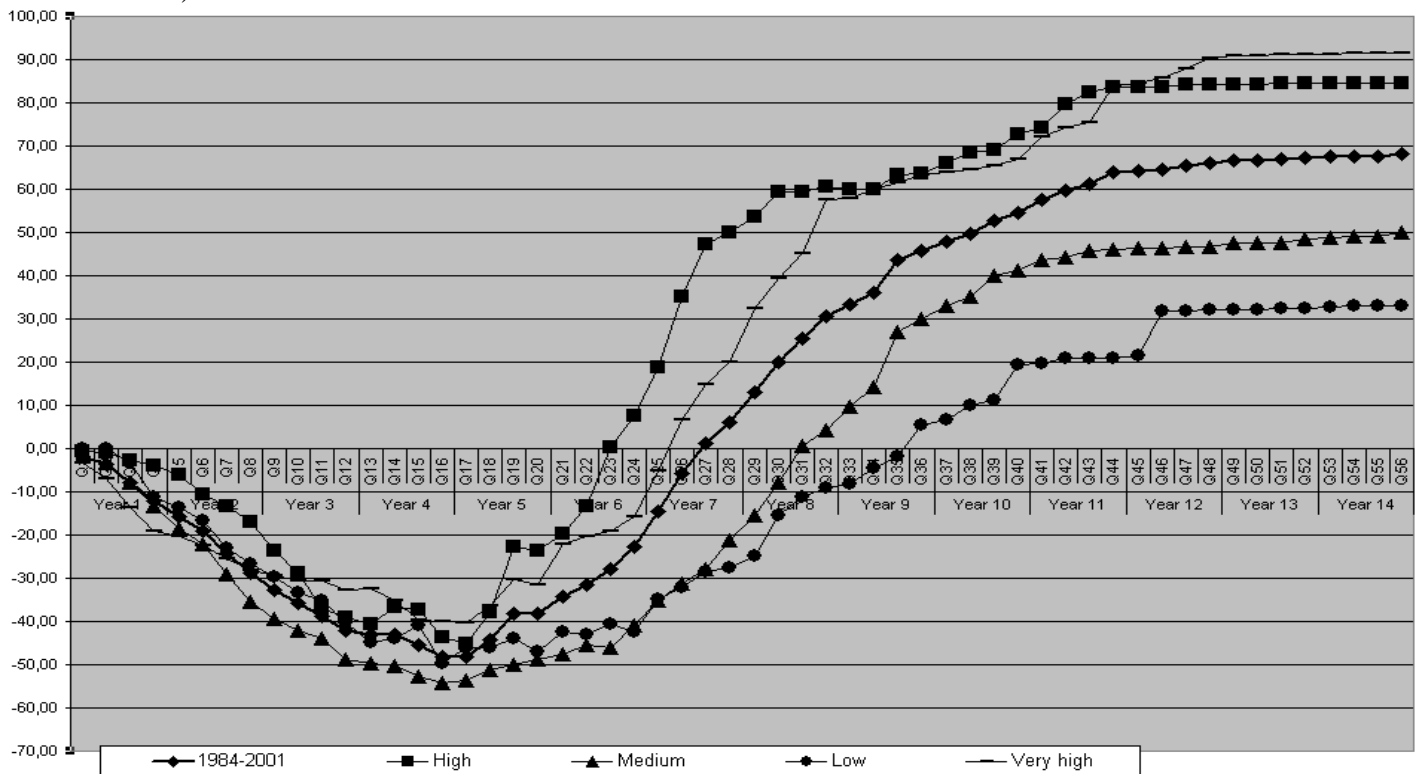


*Reading graphical representations is insufficient for tentative performance predictions*

Reading the potential performance from the graphical illustration remains difficult. EMEA LBO funds' J-Curves (Exhibit 11) clearly differentiate the “High” and “Very high” returns funds from “Medium” and “Low” returns. The first two categories bottom out respectively at –45% and –40%, while the next two reach respectively –55% and –50%. “High” returns cross the x-axis in Year 6 (Q23) and “Very high” returns in Year 7 (Q25); while “Medium” returns cross the axis in Year 8 (Q31) and “Low” returns in Year 9 (Q35). “High” returns show a more attractive profile than “Very high” returns until Year 11. This suggests that it is necessary to break down the return categories differently for EMEA, or that there is the presence of outliers in the cash-flows. Exhibit 12 illustrates the difficulty of predicting the performance of current vintages based on their J-Curves. The case in point is VY 2002: it drew down a maximum of 40% of its commitment and crossed the x-axis in Year 6, which would qualify it for “High” returns. However, its performance since Year 7 draws it towards the “Medium” category. VY 2003 seemed to be “Low” performance but crossed the x-axis in Year 9.

Exhibit 11. Cumulated cash-flows curves of EMEA LBO funds for the periods 1984-2001, high, medium, low and very high returns periods

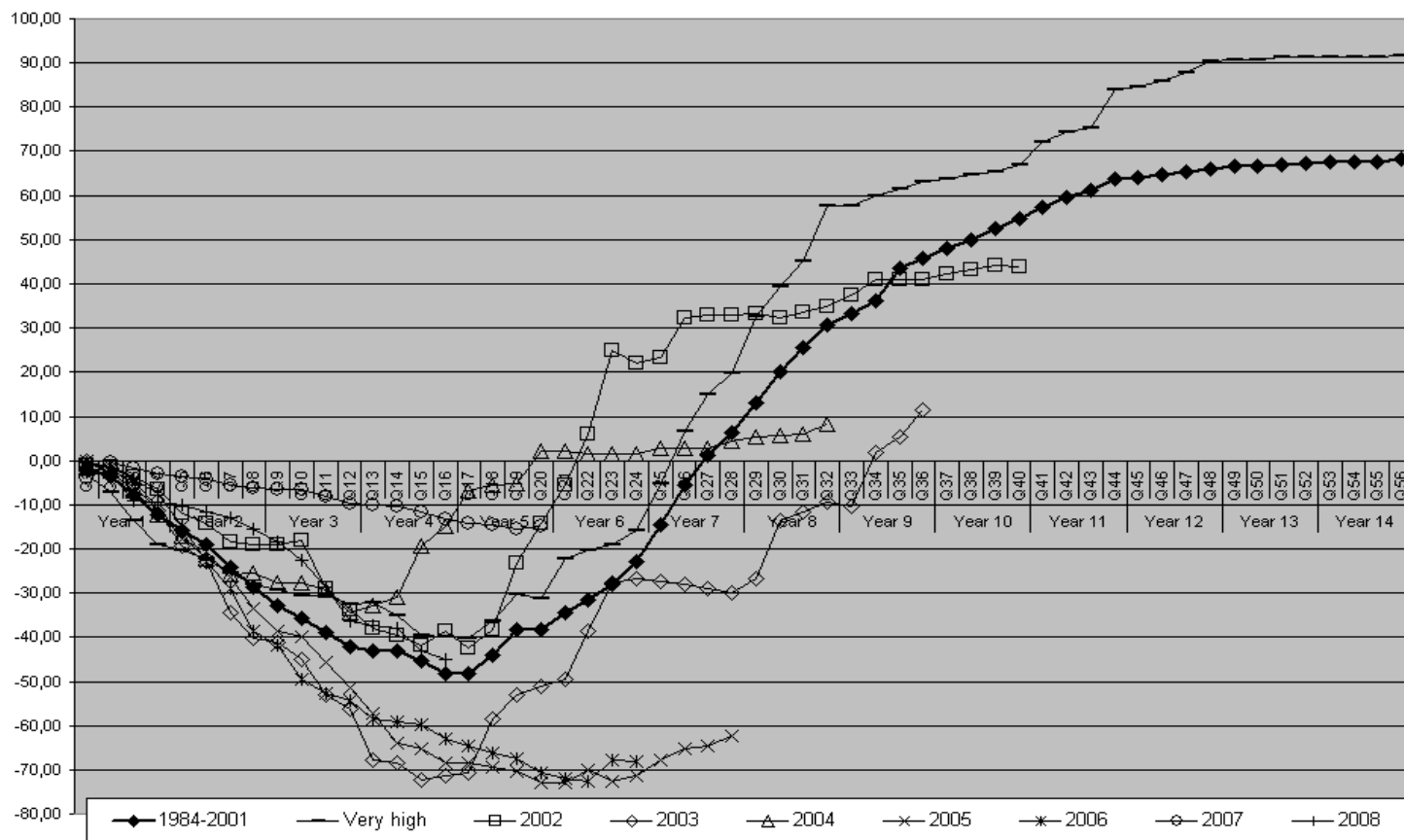
This figure provides five cumulated cash-flow curves, based on data reported by Thomson ONE Banker18 (re-scaled on a basis 100), excluding outliers. Four ideal types are identified: “high” returns (VYs 1984, 1986, 1995, 2001), “medium” returns (VYs 1987, 1991, 1997, 1998, 1999), “low” returns (VY 1989 only) and “very high” returns (VYs 1991, 1994 and 2000).



## THE PREDICTIVE POWER OF THE J-CURVE

Exhibit 12. Cumulated cash-flows curves of EMEA LBO funds for the periods 1984-2001, a “Very high” returns period, and the years 2002, 2003, 2004, 2005, 2006, 2007 and 2008

The figure provides nine cumulated cash-flow curves: the period “1984-2001” (VYs 1984, 1986, 1987, 1989, 1991, 1992, 1994, 1995, 1997, 1998, 1999, 2000 and 2001), “very high” returns (VYs 1991, 1994 and 2000), and active VYs 2002, 2003, 2004, 2005, 2006, 2007 and 2008, based on data from Thomson ONE Banker (re-scaled on a basis 100).



### Correlation analysis of the J-Curves

Though graphical interpretation of J-Curves is difficult, the shape of these curves might be of use to identifying the potential performance of a VY. Given the flaws of data available, our method will focus on measuring the distance of a given VY from the “ideal-types” categories.

### US VC

Exhibit 13 provides a correlation matrix for US VC funds by VYs (fully realized and unrealized) and by categories. “Low” returns categories clearly appear as negatively correlated with the rest of the categories. “Very high” returns also exhibit a 0.71 correlation rate with “Medium” returns and a 0.92 correlation rate with “High” returns. Digging into the categories and their VYs, we have sought to identify which vintage is the most representative of each category. 1985 exhibits a 1.0 correlation with “Medium” returns (and a higher differentiation with other categories than VY 1987, which also exhibits a 1.0 correlation with “Medium” returns). 1990 is the most representative VY of “High” (1.0), 1995 of “Very high” (0.98) and 2000 of “Low” returns (0.79). Focusing on unrealized VYs, 2002, 2003, 2004 and 2005 would belong to the “Low” returns categories. VY 2006 does not appear clearly as

belonging either to a “Low” or a “Medium” returns category (yet). It is clear that it will not be a “Very high” return VY, and most likely not a “High” returns VY. VY 2007 is excluded from the “Very high” returns category, and VY 2008 drifts away from this category. Most likely, 2007 and 2008 would belong to “Medium” returns. VY 2009 is difficult to attribute, but a closer look shows that its pattern exhibits a correlation of 1.0 with VYs 2003, 2005 and 2006.

### US LBO

The exercise is repeated for US LBO funds (Exhibit 14). The differentiation between the vintages is much smaller<sup>19</sup>. Though less important, we judge the correlations rates sufficiently distinct to draw conclusions. 1986 is the most representative VY of “Very high” returns; 1990 of “Low”, 1993 of “High” and 1995 of “Medium” returns. Analyzing unrealized VYs, a first phenomenon appears: some correlation rates fall at or below 0.6. This might signal a potential new category. 2002 appears as most likely to be a “Medium” vintage (0.95 category correlation, 0.97 with VY 1995). 2003 is likely to be a “High” vintage (0.93 category correlation, 0.94 with VY 1993). 2004 is leaning towards “Medium” (0.88 category correlation, 0.92 with VY 1995), though “Low” returns remain possible. VY 2005 is likely to exhibit “Low” performances (0.98 category correlation, 0.98 with VY 1990). VY 2006 could be also “Low” (0.95 category correlation as well as with “Medium”, but a 0.95 correlation rate with 1990 and a 0.94 with VY 1995). VY 2007 is likely to be a “Medium” performance (0.97 category correlation, though “Low” is close at 0.96 – and both representative VY are at 0.96). 2008 and 2009 will not be “Very high” return vintages, 2008 most likely to be “Medium” to “Low” and 2009 “Medium” to “High”.

### EMEA VC

Exhibit 15 provides the results for EMEA VC funds. The different categories appear as very distinctive, but not necessarily very representative. In fact “Very high” returns relies only on VY 1990. “High returns” rely on two vintages (1984 being the most representative). “Medium” returns rely on four VYs (1991 as the most representative) and “Low” returns on three vintages (2000 is the most representative). 2002 and 2003 are going to be “Low” returns VYs. 2004 is most likely to be “Low” returns VY as well (0.90 category correlation rate, 0.88 with VY 2000). 2005 is a puzzle: it shows a very strong correlation with “Low” and at the same time “Very high” returns (0.99 correlation with both categories). This can be related to the quality of the underlying cash-flows, which is insufficient; or the emergence of a new category. It can mean that VY 1990 started as a “Low” returns vintage to later recover spectacularly. 2006 is most likely a “Low” returns VY (0.93 category correlation, at par with “Medium”, but the highest correlation is with VY 2000). 2007 leans closer to “Medium” than “Low” (0.98 category correlation versus 0.97) but the closest VY is 2000. 2008 leans towards “High” returns (0.98 category correlation, at par with “Medium”, but the highest correlation is with 1984), while 2009 leans towards “Low” (category correlation) to Medium (VY correlation).

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<sup>19</sup> This might be an argument to refine the categories and aggregate the vintages differently, should this investigation be a support for further research (with higher density and quality of data)

# THE PREDICTIVE POWER OF THE J-CURVE

Exhibit 13. Correlation table for US VC funds, by VY (1980-2009) and category of returns (very high, high, medium and low)

This table provides the results of correlation tests between of the cash-flow curves for US VC funds by VY and by category of returns (very high, high, medium and low) as well as the 1980-2001 average. Cash-flows are provided by Thomson ONE database (as of 31/12/2011). Categories are ours.

Correlation Matrix					High		Medium					High					Very high					Low																
1980-2001					Medium	High	Very high	Low	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1980-2001	1	0,94	0,99	0,90	-0,55	1,00	0,97	0,95	0,92	0,90	0,93	0,84	0,96	0,97	0,93	0,98	0,98	0,97	0,96	0,95	0,86	0,73	0,79	0,98	0,38	0,10	0,16	-0,08	-0,14	0,13	0,22	0,61	0,83	0,86	0,93			
Medium	0,94	1	0,90	0,71	-0,36	0,93	0,98	0,97	0,98	0,98	1,00	0,96	1,00	0,98	0,99	0,90	0,96	0,85	0,86	0,82	0,66	0,50	0,60	0,89	0,49	0,39	0,52	0,39	0,46	0,81	0,91	0,98	1,00	0,98	0,98			
High	0,99	0,90	1	0,92	-0,62	0,99	0,94	0,91	0,87	0,85	0,88	0,78	0,93	0,96	0,91	1,00	0,97	0,99	0,98	0,98	0,89	0,75	0,79	0,97	0,28	0,02	0,11	-0,16	-0,25	-0,03	0,11	0,73	0,98	0,96	0,99			
Very high	0,90	0,71	0,92	1	-0,78	0,91	0,80	0,75	0,68	0,63	0,69	0,57	0,75	0,81	0,70	0,93	0,85	0,96	0,93	0,95	0,98	0,93	0,92	0,91	0,08	-0,30	-0,23	-0,47	-0,55	-0,42	-0,49	-0,28	0,19	0,79	0,99			
Low	-0,55	-0,36	-0,62	-0,78	1	-0,57	-0,42	-0,30	-0,25	-0,20	-0,30	-0,25	-0,42	-0,49	-0,38	-0,62	-0,49	-0,70	-0,67	-0,70	-0,81	-0,88	-0,86	-0,60	0,54	0,79	0,73	0,91	0,97	0,95	0,97	0,99	0,99	0,96	0,95			
Hi	1980	1,00	0,93	0,99	0,91	-0,57	1	0,96	0,94	0,90	0,88	0,91	0,82	0,95	0,97	0,93	0,99	0,98	0,98	0,97	0,96	0,86	0,74	0,80	0,98	0,35	0,08	0,16	-0,10	-0,17	0,09	0,23	0,64	0,86	0,88	0,96		
	1981	0,97	0,98	0,94	0,80	-0,42	0,96	1	0,97	0,97	0,95	0,97	0,92	0,97	0,96	0,96	0,93	0,97	0,89	0,88	0,88	0,76	0,61	0,68	0,91	0,47	0,28	0,39	0,19	0,18	0,45	0,54	0,86	0,95	0,95	0,98		
	1982	0,95	0,97	0,91	0,75	-0,30	0,94	0,97	1	0,98	0,98	0,98	0,90	0,97	0,96	0,96	0,90	0,97	0,87	0,86	0,83	0,69	0,53	0,61	0,91	0,62	0,43	0,53	0,40	0,45	0,72	0,74	0,87	0,95	0,93	0,95		
	1983	0,92	0,98	0,87	0,68	-0,25	0,90	0,97	0,98	1	0,99	0,99	0,96	0,97	0,94	0,96	0,86	0,93	0,81	0,81	0,78	0,62	0,47	0,56	0,86	0,63	0,51	0,62	0,53	0,62	0,82	0,83	0,92	0,96	0,96	0,98		
	1984	0,90	0,98	0,85	0,63	-0,20	0,88	0,95	0,98	0,99	1	0,99	0,95	0,97	0,94	0,97	0,84	0,93	0,79	0,79	0,76	0,57	0,39	0,49	0,84	0,64	0,58	0,71	0,64	0,70	0,92	0,94	0,99	0,99	0,97	0,98		
	1985	0,93	1,00	0,88	0,69	-0,30	0,91	0,97	0,98	0,99	0,99	1	0,97	0,98	0,96	0,98	0,87	0,94	0,83	0,83	0,80	0,64	0,48	0,57	0,87	0,56	0,46	0,60	0,49	0,56	0,83	0,87	0,97	0,99	0,96	0,98		
	1986	0,84	0,96	0,78	0,57	-0,25	0,82	0,92	0,90	0,96	0,95	0,97	1,00	0,93	0,89	0,93	0,77	0,85	0,71	0,72	0,70	0,53	0,39	0,49	0,77	0,50	0,52	0,73	0,75	0,81	0,95	0,95	0,98	0,99	0,99	0,97		
	1987	0,96	1,00	0,93	0,75	-0,42	0,95	0,97	0,97	0,97	0,97	0,98	1	1	0,99	0,99	0,92	0,97	0,89	0,89	0,85	0,70	0,55	0,65	0,92	0,44	0,30	0,41	0,24	0,30	0,72	0,88	0,98	0,99	0,96	0,97		
	1988	0,97	0,98	0,96	0,81	-0,49	0,97	0,96	0,96	0,94	0,94	0,96	0,89	0,99	1	1	0,95	0,99	0,93	0,94	0,89	0,76	0,61	0,70	0,94	0,37	0,20	0,29	0,08	0,05	0,46	0,76	0,96	0,99	0,99	0,99		
	1989	0,93	0,99	0,91	0,70	-0,38	0,93	0,96	0,96	0,96	0,97	0,98	0,93	0,99	0,98	1,00	0,90	0,96	0,86	0,87	0,82	0,66	0,49	0,60	0,89	0,43	0,35	0,49	0,34	0,39	0,75	0,95	0,98	0,97	0,99	0,98		
Medium	1990	0,98	0,90	1,00	0,93	-0,62	0,99	0,93	0,90	0,86	0,84	0,87	0,77	0,92	0,95	0,90	1	0,97	0,99	0,98	0,98	0,90	0,75	0,79	0,96	0,26	0,00	0,11	-0,17	-0,27	-0,06	0,08	0,74	0,99	0,98	0,99		
	1991	0,98	0,96	0,97	0,85	-0,49	0,98	0,97	0,97	0,93	0,93	0,94	0,85	0,97	0,99	0,96	0,97	1	0,95	0,94	0,92	0,81	0,65	0,71	0,95	0,40	0,20	0,30	0,09	0,07	0,37	0,55	0,82	0,99	0,99	0,99		
	1992	0,97	0,85	0,99	0,96	-0,70	0,98	0,89	0,87	0,81	0,79	0,83	0,71	0,89	0,93	0,86	0,99	0,95	1	0,99	0,98	0,93	0,82	0,85	0,96	0,19	-0,11	-0,03	-0,29	-0,41	-0,26	-0,25	0,11	0,81	0,97	0,99		
	1993	0,96	0,86	0,98	0,93	-0,67	0,97	0,88	0,86	0,81	0,79	0,83	0,72	0,89	0,94	0,87	0,98	0,94	0,99	1	0,95	0,88	0,78	0,83	0,97	0,20	-0,07	0,00	-0,25	-0,36	-0,21	-0,17	0,17	0,62	0,91	0,99		
	1994	0,95	0,82	0,98	0,93	-0,70	0,96	0,88	0,83	0,78	0,76	0,80	0,70	0,85	0,89	0,82	0,98	0,92	0,98	0,95	1	0,94	0,81	0,83	0,94	0,14	-0,15	-0,05	-0,33	-0,43	-0,26	-0,25	0,47	0,95	0,97	0,99		
	1995	0,86	0,66	0,89	0,98	-0,81	0,86	0,76	0,69	0,62	0,57	0,64	0,53	0,70	0,76	0,66	0,90	0,81	0,93	0,88	0,94	1	0,92	0,88	0,86	-0,01	-0,37	-0,29	-0,52	-0,60	-0,50	-0,54	-0,40	0,30	0,87	0,92		
	1996	0,73	0,50	0,75	0,93	-0,88	0,74	0,61	0,53	0,47	0,39	0,48	0,39	0,55	0,61	0,49	0,75	0,65	0,82	0,78	0,81	0,92	1,00	0,95	0,75	-0,16	-0,57	-0,54	-0,72	-0,75	-0,68	-0,74	-0,66	-0,49	0,30	0,95		
	1997	0,79	0,60	0,79	0,92	-0,86	0,80	0,68	0,61	0,56	0,49	0,57	0,49	0,65	0,70	0,60	0,79	0,71	0,85	0,83	0,83	0,88	1	1	0,84	-0,09	-0,50	-0,52	-0,72	-0,78	-0,68	-0,79	-0,67	-0,55	-0,36	0,94		
	1998	0,98	0,89	0,97	0,91	-0,60	0,98	0,91	0,91	0,86	0,84	0,87	0,77	0,92	0,94	0,89	0,96	0,95	0,96	0,97	0,94	0,86	0,75	0,84	1	0,32	0,01	0,04	-0,19	-0,29	-0,06	-0,05	0,24	0,40	0,43	0,75		
	Very high	1999	0,38	0,49	0,28	0,08	0,54	0,35	0,47	0,62	0,63	0,64	0,56	0,50	0,44	0,37	0,43	0,26	0,40	0,19	0,20	0,14	-0,01	-0,16	-0,09	0,32	1	0,87	0,80	0,82	0,82	0,90	0,83	0,88	0,91	0,86	0,90	
2000		0,10	0,39	0,02	-0,30	0,79	0,08	0,28	0,43	0,51	0,58	0,46	0,52	0,30	0,20	0,35	0,00	0,20	-0,11	-0,07	-0,15	-0,37	-0,57	-0,50	0,01	0,87	1	0,95	0,99	0,97	0,99	0,98	0,99	0,99	0,96	0,95		
2001		0,16	0,52	0,11	-0,23	0,73	0,16	0,39	0,53	0,62	0,71	0,60	0,73	0,41	0,29	0,49	0,11	0,30	-0,03	0,00	-0,05	-0,29	-0,54	-0,52	0,04	0,80	0,95	1	0,97	0,95	0,97	0,99	0,98	0,98	1,00	0,99		
2002		-0,08	0,39	-0,16	-0,47	0,91	-0,10	0,19	0,40	0,53	0,64	0,49	0,75	0,24	0,08	0,34	-0,17	0,09	-0,29	-0,25	-0,33	-0,52	-0,72	-0,72	-0,19	0,82	0,99	0,97	1	0,99	0,98	1,00	0,99	0,99	1,00	0,99		
2003		-0,14	0,46	-0,25	-0,55	0,97	-0,17	0,18	0,45	0,62	0,70	0,56	0,81	0,30	0,05	0,39	-0,27	0,07	-0,41	-0,36	-0,43	-0,60	-0,75	-0,78	-0,29	0,82	0,99	0,97	0,98	0,98	1	0,98	1,00	0,99	0,97	0,99		
2004		0,13	0,81	-0,03	-0,42	0,95	0,09	0,45	0,72	0,82	0,92	0,83	0,95	0,72	0,46	0,75	-0,06	0,37	-0,26	-0,21	-0,26	-0,50	-0,68	-0,68	-0,06	0,90	0,99	0,97	0,98	0,98	1	0,98	1,00	0,99	0,97	0,99		
2005		0,22	0,91	0,11	-0,49	0,97	0,23	0,54	0,74	0,83	0,94	0,87	0,95	0,88	0,76	0,95	0,08	0,55	-0,25	-0,17	-0,25	-0,54	-0,74	-0,79	-0,05	0,83	0,98	0,99	1,00	1,00	0,98	1	0,99	0,99	1,00	1,00		
2006		0,61	0,98	0,73	-0,28	0,99	0,64	0,86	0,87	0,92	0,99	0,97	0,98	0,98	0,96	0,98	0,74	0,82	0,11	0,17	0,47	-0,40	-0,66	-0,67	0,24	0,88	0,99	0,98	0,99	1,00	1,00	0,99	1	1,00	0,98	1,00		
2007		0,83	1,00	0,98	0,19	0,99	0,86	0,95	0,95	0,96	0,99	0,99	0,99	0,99	0,99	0,97	0,99	0,99	0,81	0,62	0,95	0,30	-0,49	-0,55	0,40	0,91	0,99	0,98	0,99	0,99	0,99	0,99	1,00	1	0,98	0,99		
2008		0,86	0,98	0,96	0,79																																	

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Exhibit 14. Correlation table for US LBO funds, by VY (1984-2009) and category of returns (very high, high, medium and low)

This table provides the results of correlation tests between of the cash-flow curves for US LBO funds by VY and by category of returns (very high, high, medium and low) as well as the 1984-2001 average. Cash-flows are provided by Thomson ONE database (as of 31/12/2011). Categories are ours.

Correlation Matrix						Very high				Med.	Hi	Low	High				Med.	Low					Med.												
1984-2001						Very high	Medium	High	Low	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1984-2001	1	0.87	1.00	0.96	0.98	0.87	0.88	0.81	0.94	0.99	0.96	0.98	0.95	0.90	0.96	0.95	0.99	0.96	0.99	0.93	0.97	0.98	0.97	0.95	0.89	0.94	0.95	0.98	0.96	0.98	0.98	0.98			
Very high	0.87	1	0.89	0.90	0.84	0.98	0.97	0.97	0.86	0.89	0.89	0.84	0.88	0.87	0.90	0.91	0.87	0.77	0.82	0.66	0.73	0.88	0.83	0.63	0.84	0.22	-0.20	-0.11	0.05	0.45	0.82				
Medium	1.00	0.89	1	0.98	0.98	0.89	0.90	0.83	0.94	0.99	0.98	0.98	0.96	0.93	0.98	0.95	0.99	0.94	0.98	0.89	0.94	0.99	0.99	0.95	0.91	0.88	0.90	0.95	0.97	0.99	0.97				
High	0.96	0.90	0.98	1	0.96	0.93	0.92	0.81	0.87	0.95	0.99	0.96	0.98	0.97	1.00	0.90	0.96	0.87	0.93	0.81	0.86	0.98	0.96	0.86	0.93	0.66	0.59	0.86	0.93	0.98	0.98				
Low	0.98	0.84	0.98	0.96	1	0.85	0.88	0.78	0.93	0.98	0.98	1.00	0.97	0.88	0.95	0.90	0.97	0.92	0.98	0.87	0.92	0.96	0.94	0.88	0.85	0.87	0.98	0.95	0.96	0.98	0.94				
Very high	1984	0.87	0.98	0.89	0.93	0.85	1	0.98	0.91	0.81	0.87	0.91	0.85	0.90	0.93	0.93	0.89	0.87	0.76	0.81	0.64	0.71	0.86	0.80	0.61	0.82	0.21	-0.21	-0.13	0.05	0.58	0.90			
	1985	0.88	0.97	0.90	0.92	0.88	0.98	1	0.90	0.87	0.90	0.92	0.88	0.93	0.89	0.92	0.91	0.89	0.79	0.85	0.68	0.74	0.86	0.79	0.60	0.80	0.18	-0.25	-0.12	-0.10	0.33	0.92			
	1986	0.81	0.97	0.83	0.81	0.78	0.91	0.90	1	0.85	0.85	0.80	0.78	0.80	0.76	0.82	0.87	0.81	0.73	0.77	0.62	0.71	0.87	0.87	0.65	0.81	0.23	-0.09	-0.02	0.16	0.20	0.39			
	1987	0.94	0.86	0.94	0.87	0.93	0.81	0.87	0.85	1	0.96	0.89	0.93	0.89	0.76	0.86	0.95	0.95	0.94	0.96	0.88	0.92	0.87	0.87	0.84	0.60	0.89	0.97	0.99	0.95	0.97	0.98			
Hi Mt.	1988	0.99	0.89	0.99	0.95	0.98	0.87	0.90	0.85	0.96	1	0.97	0.98	0.96	0.87	0.95	0.94	0.99	0.94	0.98	0.89	0.94	0.97	0.96	0.93	0.83	0.90	0.98	0.96	0.98	0.99	0.96			
	1989	0.96	0.89	0.98	0.99	0.98	0.91	0.92	0.80	0.89	0.97	1	0.98	0.99	0.94	0.98	0.89	0.96	0.87	0.94	0.81	0.87	0.97	0.96	0.86	0.89	0.65	0.69	0.94	0.98	0.99	0.97			
L.	1990	0.98	0.84	0.98	0.96	1.00	0.85	0.88	0.78	0.93	0.98	0.98	1	0.97	0.88	0.95	0.90	0.97	0.92	0.98	0.87	0.92	0.96	0.94	0.88	0.85	0.87	0.98	0.95	0.96	0.98	0.94			
	1991	0.95	0.88	0.96	0.98	0.97	0.90	0.93	0.80	0.89	0.96	0.99	0.97	1	0.92	0.96	0.89	0.95	0.87	0.94	0.80	0.86	0.94	0.92	0.82	0.89	0.71	0.71	0.92	0.94	0.92	0.92			
High	1992	0.90	0.87	0.93	0.97	0.88	0.93	0.89	0.76	0.76	0.87	0.94	0.88	0.92	1	0.97	0.84	0.90	0.79	0.84	0.73	0.78	0.93	0.91	0.81	0.90	0.52	0.28	0.56	0.77	0.94	0.97			
	1993	0.96	0.90	0.98	1.00	0.95	0.93	0.92	0.82	0.86	0.95	0.98	0.95	0.96	0.97	1	0.90	0.95	0.87	0.93	0.82	0.87	0.98	0.95	0.86	0.94	0.70	0.64	0.85	0.91	0.97	0.97			
Med.	1994	0.95	0.91	0.95	0.90	0.90	0.89	0.91	0.87	0.95	0.94	0.89	0.90	0.89	0.84	0.90	1	0.95	0.93	0.93	0.86	0.92	0.90	0.87	0.83	0.83	0.80	0.71	0.79	0.80	0.79	0.89			
	1995	0.99	0.87	0.99	0.96	0.97	0.87	0.89	0.81	0.95	0.99	0.96	0.97	0.95	0.90	0.95	0.95	1	0.96	0.98	0.91	0.95	0.97	0.97	0.97	0.86	0.92	0.91	0.94	0.96	0.99	0.97			
Low	1996	0.96	0.77	0.94	0.87	0.92	0.76	0.79	0.73	0.94	0.94	0.87	0.92	0.87	0.79	0.87	0.93	0.96	1	0.96	0.96	0.97	0.88	0.86	0.92	0.70	0.92	0.94	0.94	0.94	0.99	0.98			
	1997	0.99	0.82	0.98	0.93	0.98	0.81	0.85	0.77	0.96	0.98	0.94	0.98	0.94	0.84	0.93	0.93	0.98	0.96	1	0.93	0.97	0.95	0.92	0.90	0.78	0.92	0.98	0.99	0.98	0.97	0.98			
Med.	1998	0.93	0.66	0.89	0.81	0.87	0.64	0.68	0.62	0.88	0.89	0.81	0.87	0.80	0.73	0.82	0.86	0.91	0.96	0.93	1	0.98	0.84	0.82	0.87	0.67	0.95	0.98	0.99	0.95	0.96	0.99			
	1999	0.97	0.73	0.94	0.86	0.92	0.71	0.74	0.71	0.92	0.94	0.87	0.92	0.86	0.78	0.87	0.92	0.95	0.97	0.97	0.98	1	0.91	0.87	0.91	0.75	0.93	0.97	0.99	0.97	0.95	0.98			
	2000	0.98	0.88	0.99	0.98	0.96	0.86	0.86	0.87	0.87	0.97	0.97	0.96	0.94	0.93	0.98	0.90	0.97	0.88	0.95	0.84	0.91	1	0.98	0.91	0.93	0.84	0.87	0.95	0.96	0.98	0.97			
	2001	0.97	0.83	0.99	0.96	0.94	0.80	0.79	0.87	0.87	0.96	0.96	0.94	0.92	0.91	0.95	0.87	0.97	0.86	0.92	0.82	0.87	0.98	1	0.94	0.87	0.81	0.85	0.94	0.96	0.99	0.96			
2002	0.95	0.63	0.95	0.86	0.88	0.61	0.80	0.65	0.84	0.93	0.86	0.88	0.82	0.81	0.86	0.83	0.97	0.92	0.90	0.87	0.91	0.91	0.94	1	0.80	0.86	0.86	0.90	0.95	0.99	0.96				
2003	0.89	0.84	0.91	0.93	0.85	0.82	0.80	0.81	0.60	0.83	0.89	0.85	0.89	0.90	0.94	0.83	0.86	0.70	0.78	0.67	0.75	0.93	0.87	0.80	1	0.78	0.59	0.70	0.76	0.92	0.97				
2004	0.94	0.22	0.88	0.66	0.87	0.21	0.18	0.23	0.89	0.90	0.65	0.87	0.71	0.52	0.70	0.80	0.92	0.92	0.92	0.95	0.93	0.84	0.81	0.86	0.78	1	0.92	0.94	0.86	0.97	0.98				
2005	0.95	-0.20	0.90	0.59	0.98	-0.21	-0.25	-0.09	0.97	0.98	0.69	0.98	0.71	0.28	0.64	0.71	0.91	0.94	0.98	0.98	0.97	0.87	0.85	0.86	0.59	0.92	1	0.98	0.97	0.99	0.98				
2006	0.98	-0.11	0.95	0.86	0.95	-0.13	-0.12	-0.02	0.99	0.96	0.94	0.95	0.92	0.56	0.85	0.79	0.94	0.94	0.99	0.99	0.99	0.95	0.94	0.90	0.70	0.94	0.98	1	0.96	0.95	0.99				
2007	0.96	0.05	0.97	0.93	0.96	0.05	-0.10	0.16	0.95	0.98	0.98	0.96	0.94	0.77	0.91	0.80	0.96	0.94	0.98	0.95	0.97	0.96	0.96	0.95	0.76	0.86	0.97	0.96	1	0.97	0.96				
2008	0.98	0.45	0.99	0.98	0.98	0.58	0.33	0.20	0.97	0.99	0.99	0.99	0.98	0.92	0.94	0.97	0.79	0.99	0.99	0.97	0.96	0.95	0.98	0.99	0.99	0.92	0.97	0.99	0.95	0.97	1	0.97			
2009	0.98	0.82	0.97	0.98	0.94	0.90	0.92	0.39	0.98	0.96	0.97	0.94	0.92	0.97	0.97	0.89	0.97	0.98	0.98	0.99	0.98	0.97	0.96	0.96	0.97	0.98	0.98	0.98	0.99	0.96	0.97	1			

\* Data as of December 31st, 2011

\*\* Categorisation based on ThomsonOne's communicated returns

Exhibit 15. Correlation table for EMEA VC funds, by VY (1981-2009) and category of returns (very high, high, medium and low)

This table provides the results of correlation tests between of the cash-flow curves for EMEA VC funds by VY and by category of returns (very high, high, medium and low) as well as the 1981-2001 average. Cash-flows are provided by Thomson ONE database (as of 31/12/2011). Categories are ours.

\* Data as of December 31st, 2011  
\*\* Categorisation based on ThomsonOne's communicated returns

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Exhibit 16. Correlation table for EMEA LBO funds, by VY (1984-2009) and category of returns (very high, high, medium and low)

This table provides the results of correlation tests between of the cash-flow curves for EMEA LBO funds by VY and by category of returns (very high, high, medium and low) as well as the 1984-2001 average. Cash-flows are provided by Thomson ONE database (as of 31/12/2011). Categories are ours.

Correlation Matrix					High				Me.	Low	Me.	V.H.	V.H	H.	Medium				V.H.	High												
	1984-2001	High	Medium	Low	Very high	1984	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009		
H	1984-2001	1	0.98	0.99	0.95	0.99	0.92	0.97	0.94	0.94	0.95	0.90	1.00	0.99	0.96	0.99	0.79	0.96	0.94	0.99	0.98	0.99	0.97	0.89	0.87	0.62	0.48	0.85	0.96	0.95	0.99	
	High	0.98	1	0.93	0.87	0.98	0.87	0.96	0.88	0.85	0.87	0.82	0.97	0.98	0.99	0.98	0.87	0.97	0.85	0.96	0.92	0.97	1.00	0.96	0.79	0.71	0.08	0.54	0.87	0.96	0.97	
	Medium	0.99	0.93	1	0.98	0.96	0.92	0.94	0.96	0.97	0.98	0.95	0.98	0.97	0.91	0.95	0.70	0.92	0.98	0.99	0.99	0.95	0.90	0.78	0.92	0.41	0.83	0.95	0.97	0.94	0.98	
	Low	0.95	0.87	0.98	1	0.92	0.93	0.92	0.98	0.98	1.00	0.97	0.94	0.92	0.85	0.90	0.62	0.86	0.98	0.96	0.96	0.89	0.83	0.66	0.91	0.20	0.93	0.98	0.98	0.95	0.98	
	Very High	0.99	0.98	0.96	0.92	1	0.92	0.98	0.92	0.92	0.92	0.85	0.98	0.99	0.97	0.99	0.82	0.96	0.91	0.98	0.96	1.00	0.98	0.90	0.77	0.66	0.15	0.65	0.95	0.91	0.94	
M	1984	0.92	0.87	0.92	0.93	0.92	1	0.95	0.96	0.93	0.93	0.85	0.90	0.91	0.87	0.91	0.72	0.90	0.92	0.91	0.90	0.92	0.87	0.81	0.82	0.84	0.23	0.45	0.58	0.60	0.95	
	1986	0.97	0.96	0.94	0.92	0.98	0.95	1	0.94	0.92	0.92	0.83	0.95	0.97	0.95	0.97	0.80	0.94	0.90	0.95	0.92	0.97	0.97	0.91	0.73	0.73	0.07	0.57	0.74	0.73	0.97	
	1987	0.94	0.88	0.96	0.98	0.92	0.96	0.94	1	0.96	0.98	0.93	0.93	0.92	0.87	0.90	0.66	0.89	0.96	0.95	0.94	0.89	0.84	0.72	0.93	0.45	0.79	0.87	0.94	0.87	0.97	
	1988	0.94	0.85	0.97	0.98	0.92	0.93	0.92	0.96	1	0.98	0.95	0.92	0.91	0.83	0.90	0.56	0.83	0.98	0.94	0.97	0.89	0.80	0.57	0.75	-0.08	0.90	0.95	0.95	0.89	0.96	
L	1989	0.95	0.87	0.98	1.00	0.92	0.93	0.92	0.98	0.98	1	0.97	0.94	0.92	0.85	0.90	0.62	0.86	0.98	0.96	0.96	0.89	0.83	0.66	0.91	0.20	0.93	0.98	0.98	0.95	0.98	
	1990	0.90	0.82	0.95	0.97	0.85	0.85	0.83	0.93	0.95	0.97	1	0.91	0.87	0.79	0.82	0.54	0.80	0.96	0.93	0.93	0.81	0.74	0.59	0.87	0.02	0.93	0.96	0.98	0.97	0.98	
	1991	1.00	0.97	0.98	0.94	0.98	0.90	0.95	0.93	0.92	0.94	0.91	1	0.99	0.96	0.98	0.80	0.96	0.93	1.00	0.98	0.98	0.97	0.90	0.91	0.62	0.51	0.80	0.96	0.95	0.99	
VH	1992	0.99	0.98	0.97	0.92	0.99	0.91	0.97	0.92	0.91	0.92	0.87	0.99	1	0.98	0.99	0.82	0.97	0.90	0.98	0.96	0.99	0.98	0.92	0.83	0.69	0.24	0.65	0.93	0.90	0.94	
	1993	0.96	0.99	0.91	0.85	0.97	0.87	0.95	0.87	0.83	0.85	0.79	0.96	0.98	1	0.97	0.90	0.98	0.82	0.95	0.89	0.96	0.98	0.97	0.77	0.79	-0.04	0.32	0.79	0.85	0.92	
Medium	1994	0.99	0.98	0.95	0.90	0.99	0.91	0.97	0.90	0.90	0.90	0.82	0.98	0.99	0.97	1	0.84	0.97	0.89	0.97	0.94	0.99	0.97	0.90	0.71	0.73	-0.12	0.24	0.69	0.79	0.94	
	1995	0.79	0.87	0.70	0.62	0.82	0.72	0.80	0.66	0.56	0.62	0.54	0.80	0.82	0.90	0.84	1	0.91	0.80	0.78	0.65	0.78	0.82	0.90	0.55	0.89	-0.43	-0.32	0.00	0.94	0.97	
	1996	0.96	0.97	0.92	0.86	0.96	0.90	0.94	0.89	0.83	0.86	0.80	0.96	0.97	0.98	0.97	0.91	1	0.85	0.96	0.89	0.94	0.94	0.94	0.77	0.93	-0.08	0.16	0.57	0.74	0.96	
	1997	0.94	0.85	0.98	0.98	0.91	0.92	0.90	0.96	0.98	0.98	0.96	0.93	0.90	0.82	0.89	0.60	0.85	1	0.95	0.96	0.87	0.77	0.59	0.84	0.08	0.96	0.97	0.96	0.96	0.97	
	1998	0.99	0.96	0.99	0.96	0.98	0.91	0.95	0.95	0.94	0.96	0.93	1.00	0.98	0.95	0.97	0.78	0.96	0.95	1	0.98	0.97	0.95	0.88	0.93	0.62	0.58	0.84	0.94	0.93	0.98	
	1999	0.98	0.92	0.99	0.96	0.96	0.90	0.92	0.94	0.97	0.96	0.93	0.98	0.96	0.89	0.94	0.65	0.89	0.96	0.98	1	0.95	0.90	0.75	0.86	0.29	0.87	0.98	0.99	0.92	0.96	
	2000	0.99	0.97	0.95	0.89	1.00	0.92	0.97	0.89	0.89	0.89	0.81	0.98	0.99	0.96	0.99	0.78	0.94	0.87	0.97	0.95	1	0.98	0.90	0.78	0.63	0.21	0.71	0.96	0.92	0.93	
H.	2001	0.97	1.00	0.90	0.83	0.98	0.87	0.97	0.84	0.80	0.83	0.74	0.97	0.98	0.98	0.97	0.82	0.94	0.77	0.95	0.90	0.98	1	0.95	0.79	0.66	0.16	0.67	0.92	0.97	0.96	
	2002	0.89	0.96	0.78	0.66	0.90	0.81	0.91	0.72	0.57	0.66	0.59	0.90	0.92	0.97	0.90	0.90	0.94	0.59	0.88	0.75	0.90	0.95	1	0.79	0.77	-0.04	0.22	0.84	0.97	0.96	
	2003	0.87	0.79	0.92	0.91	0.77	0.82	0.73	0.93	0.75	0.91	0.87	0.91	0.83	0.77	0.71	0.55	0.77	0.84	0.93	0.86	0.78	0.79	0.79	1	0.50	0.68	0.79	0.94	0.96	0.98	
	2004	0.62	0.71	0.41	0.20	0.66	0.84	0.73	0.45	-0.08	0.20	0.02	0.62	0.69	0.79	0.73	0.89	0.93	0.08	0.62	0.29	0.63	0.66	0.77	0.50	1	-0.27	-0.10	0.16	0.61	0.96	
	2005	0.48	0.08	0.83	0.93	0.15	0.23	0.07	0.79	0.90	0.93	0.93	0.51	0.24	-0.04	-0.12	-0.43	-0.08	0.96	0.58	0.87	0.21	0.16	-0.04	0.68	-0.27	1	0.99	0.98	0.97	0.98	
	2006	0.85	0.54	0.95	0.98	0.65	0.45	0.57	0.87	0.95	0.98	0.96	0.80	0.65	0.32	0.24	-0.32	0.16	0.97	0.84	0.98	0.71	0.67	0.22	0.79	-0.10	0.99	1	0.98	0.94	0.98	
	2007	0.96	0.87	0.97	0.98	0.95	0.58	0.74	0.94	0.95	0.98	0.98	0.96	0.93	0.79	0.69	0.00	0.57	0.96	0.94	0.99	0.96	0.92	0.84	0.94	0.16	0.98	0.98	1	0.93	0.95	
	2008	0.95	0.96	0.94	0.95	0.91	0.60	0.73	0.87	0.89	0.95	0.97	0.95	0.90	0.85	0.79	0.94	0.74	0.96	0.93	0.92	0.92	0.97	0.97	0.96	0.61	0.97	0.94	0.93	1	0.95	
	2009	0.99	0.97	0.98	0.98	0.94	0.95	0.97	0.97	0.96	0.98	0.98	0.99	0.94	0.92	0.94	0.97	0.96	0.97	0.98	0.96	0.93	0.96	0.96	0.98	0.96	0.98	0.98	0.98	0.95	0.95	1

\* Data as of December 31st, 2011

\*\* Categorisation based on ThomsonOne's communicated returns

### EMEA LBO

Exhibit 16 provides the results for EMEA LBO funds. The same initial limitation appears: the categories are not substantially differentiated. Just like for US LBO funds, some correlation rates appear at or below 0.6 for the unrealized vintages. This might signal a new category (possibly related to the use of “dividend recaps”). VY 1989 appears as the most representative of “Low” returns, 1999 of “Medium” returns, 2000 of “Very high” and 2001 for “High returns”. 2002 is most likely to be a “High” returns VY (0.96 category correlation, 0.95 with VY 2001). 2003 leans towards “Medium” (0.92 category correlation) to “Low” (0.91 category correlation, and 0.91 with VY 1989). 2004 is a case of “High” returns (0.71 category correlation, 0.66 with VY 2001) and 2005 an example of “Low” returns (0.93 category correlation and with VY 1989), as well as 2006 (0.98 for both). 2007 appears as leaning towards “Low” (0.98 category correlation and 0.98 correlation with 1989, though the correlation is higher with 1999). 2008 is likely to be a “High” returns VY (0.96 category correlation and 0.97 with VY 2001). 2009 is leaning towards “Low” (0.98 for both).

We then tried to assess whether geographies and/or strategies are correlated (unreported). For EMEA and US VC, “Low” returns are uniquely correlated (0.97) indicating that there is a specific J-Curve profile for Low returns. As for other returns, “Medium” US VC returns correlates the most highly with “High”, “Medium” and “Very High” EMEA VC. This confirms that EMEA data have to be further assessed; and that the rather disappointing average results of local funds prevent the potential development a single model for all VC funds. For EMEA and US LBO, the picture is split between “High”/“Very high” and “Medium”/“Low”. This limits the generalization of the findings. Refining categories with better data would improve the results.

The analysis is deepened with same geographies but different strategies as they are partially correlated. Though “Low” returns do not match, “High” US VC and US LBO exhibit a perfect correlation. “Medium” US VC returns correlate with “Medium” and “Low” US LBO returns, hence confirming that there might be too many categories for LBO. “Very high” returns are also highly and distinctively correlated (0.94). The same conclusion for US funds applies to “Low” returns in EMEA VC and EMEA LBO. Other results are not conclusive. “Very high” EMEA VC returns match with “Low” EMEA LBO returns while “Medium” EMEA VC returns match with “Low” EMEA LBO returns and “High” EMEA VC returns match with “Low” EMEA LBO returns.

### *Correlations first eliminate categories and then indicate the closest comparable*

From the correlations, we conclude that:

- i) below two years of activity, correlations do not give any clear information about the performance categories which are relevant to analyze a given VY: correlations are high with all the “ideal-type” categories;
- ii) for Years 3 to 5 of funds activity, some categories drop in terms of correlation. The most likely performance appears with three and then two categories;
- iii) from Year 6 and on, the performance category to which the VY will most likely belong clearly appears.

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Exhibit 17. Synthesis: compared categorization of average US VC and LBO funds; and EMEA VC and LBO funds by VY based on initial reading and ideal-type analysis (model), predictions for unrealized funds

These tables provide the results of the categorization of average US VC and LBO funds; EMEA VC and LBO funds by VY, based on initial reading and ideal-type predictions (mixing categories and J-curves) for fully realized funds based on previous results; predictions and categorization of partially realized vintages, based on the identification by ideal-type (« model result ») and identification of the closest comparable. Data reliability is put in perspective, notably for vintages identified as problematic (signaled by a minus sign). Outliers are signaled by an “O\*”.

US VC					
Vintage year	Initial category	Model result	Confirmed initial?	Closest comparable	Data reliable?
1981	Medium	Medium	Yes		++
1982	Medium	Medium	Yes		++
1983	Medium	Medium	Yes		++
1984	Medium	Medium	Yes		++
1985	Medium	Medium	Yes		++
1986	Medium	Medium	Yes		+
1987	Medium	Medium	Yes		++
1988	Medium	Medium	Yes		++
1989	Medium	Medium	Yes		++
1990	High (O*)	High	Yes		++
1991	<b>Medium (O*)</b>	<b>High</b>	<b>No</b>		+
1992	<b>Very High</b>	<b>High</b>	<b>No</b>		++
1993	<b>Very High</b>	<b>High</b>	<b>No</b>		++
1994	<b>Very High</b>	<b>High</b>	<b>No</b>		+
1995	Very High	Very High	Yes		++
1996	Very High	Very High	Yes		++
1997	Very High	Very High	Yes		++
1998	<b>Medium (O*)</b>	<b>High</b>	<b>No</b>		++
1999	Low	Low	Yes		++
2000	Low	Low	Yes		++
2001	Low (O*)	Low	Yes		++
2002	-	Low		2000	+
2003	-	Low		2000	++
2004	-	Low		2000	++
2005	-	Low		2001	++
2006	-	Low/Medium		1984 & 2000	++
2007	-	Medium/Low/High		1984-88, 1990-91, 2000	+
2008	-	Medium/Low/High		2001	+
2009	-	High/Very High/Medium		1988, 1990-1994, 2001	+

US LBO					
Vintage year	Initial category	Model result	Confirmed initial?	Closest comparable	Data reliable?
1981	-				
1982	-				
1983	-				
1984	Very high	Very high	Yes		+
1985	Very high	Very high	Yes		++
1986	Very high	Very high	Yes		++
1987	<b>Medium (O*)</b>	<b>Medium (Low)</b>	<b>Yes</b>		-
1988	Medium	Medium (Low)	Yes		++
1989	High (O*)	High	Yes		++
1990	Low	Low	Yes		++
1991	High	High	Yes		++
1992	High	High	Yes		++
1993	<b>High</b>	<b>High</b>	<b>Yes</b>		-
1994	Medium	Medium	Yes		++
1995	<b>Medium</b>	<b>Medium</b>	<b>Yes</b>		-
1996	<b>Low</b>	<b>Medium</b>	<b>No</b>		++
1997	<b>Low</b>	<b>Medium/Low</b>	<b>No</b>		++
1998	<b>Low</b>	<b>Medium</b>	<b>No</b>		++
1999	<b>Low</b>	<b>Medium</b>	<b>No</b>		++
2000	Medium	Medium	Yes		+
2001	Medium (O*)	Medium	Yes		+
2002	-	Medium		1995	++
2003	-	High		1993	++
2004	-	Medium		1998	++
2005	-	Low		1988, 1990, 1997-98	++
2006	-	Medium/Low		1987, 1997-99	++
2007	-	Medium		1988-89, 1997	++
2008	-	Medium		1988-89, 1995-96, 2001	+
2009	-	High		1998	+

EMEA VC					
Vintage year	Initial category	Model result	Confirmed initial?	Closest comparable	Data reliable?
1981	<b>High</b>	<b>Medium</b>	<b>No</b>		+
1982	-				
1983	High (O*)	High	Yes		++
1984	High	High	Yes		+
1985	<b>Medium (O*)</b>	<b>High</b>	<b>No</b>		++
1986	High (O*)	High	Yes		++
1987	Medium	Medium	Yes		++
1988	<b>Low</b>	<b>Medium</b>	<b>No</b>		++
1989	<b>High (O*)</b>	<b>Very High</b>	<b>No</b>		++
1990	Very High (O*)	Very High	Yes		++
1991	Medium	Medium	Yes		++
1992	<b>Very High</b>	<b>High</b>	<b>No</b>		-
1993	Medium	Medium	Yes		++
1994	<b>Very High</b>	<b>Medium</b>	<b>No</b>		+
1995	Low	Low	Yes		++
1996	<b>Very High</b>	<b>Medium</b>	<b>No</b>		++
1997	<b>High (O*)</b>	<b>Medium</b>	<b>No</b>		+
1998	Medium (O*)	Medium	Yes		++
1999	Low	Low	Yes		+
2000	Low	Low	Yes		++
2001	Low	Low	Yes		+
2002	-	Low		2000, 2001	++
2003	-	Low		2001	++
2004	-	Low		1999	++
2005	-	Low/Very High		2001	++
2006	-	Medium/Low		1999	+
2007	-	Medium		1999	++
2008	-	Medium		1984-1986	+
2009	-	Low		1991	+

EMEA LBO					
Vintage year	Initial category	Model result	Confirmed initial?	Closest comparable	Data reliable?
1981	-				
1982	-				
1983	-				
1984	High (O*)	Medium/V. High	No		+
1985	-				
1986	<b>High (O*)</b>	<b>Very high</b>	<b>No</b>		-
1987	Medium	Low	No		++
1988	<b>Medium</b>	<b>Low</b>	<b>No</b>		-
1989	Low	Low	Yes		++
1990	<b>Low</b>	<b>Low</b>	<b>Yes</b>		-
1991	Medium	Medium/V. High	Yes		++
1992	Very high	Very high	Yes		++
1993	High (O*)	High	Yes		++
1994	Very high (O*)	Very high	Yes		++
1995	High (O*)	High	Yes		+
1996	<b>Medium</b>	<b>High</b>	<b>No</b>		-
1997	Medium (O*)	Medium/Low	Yes		++
1998	Medium (O*)	Medium	Yes		+
1999	Medium (O*)	Medium	Yes		++
2000	Very high	Very high	Yes		++
2001	<b>High</b>	<b>High</b>	<b>Yes</b>		-
2002	-	High		1993	++
2003	-	Medium		1987	++
2004	-	High		1996	+
2005	-	<b>Low</b>		<b>1997</b>	-
2006	-	Low		1989, 1999	++
2007	-	Low		1999	++
2008	-	High		1990, 2001	+
2009	-	Medium/Low		1991	+

## THE PREDICTIVE POWER OF THE J-CURVE

Exhibit 18. Probability that performance analysis reflects the final performance of the fund, on the basis of the interim performance assessment of the final quarter of each year, based on the ideal-types identified

These tables provide the percentage of quarterly performance analyses (at year end) reflecting the final performance of the fund (realized funds only), for average US and EMEA VC and LBO funds, based on the ideal-type categories. If year end (YE) performance equals final performance (FP), the average spread with the other categories is provided, as well as the spread with the closest comparable. If YE differs with FP, the spread with the closest comparable is provided, as well as the highest spread witnessed, the lowest, and highest among the lowest.

### VC CF USA (realized funds 1980-2001)

Fund Age (Years)	2	3	4	5	6	7	8	9	10	11	12	All (max 14 Y)
Year end performance = final performance	45,45%	59,09%	68,18%	63,64%	72,73%	81,82%	86,36%	100,00%	95,45%	100,00%	100,00%	79,65%
If YE = FP: average spread with three other categories	-0,6%	-0,7%	-6,0%	-29,1%	-41,0%	-48,6%	-49,2%	-46,3%	-46,2%	-44,8%	-44,5%	30,7%
If YE = FP: spread with closest comparable	0,4%	0,5%	4,2%	13,9%	20,2%	17,4%	19,2%	17,3%	17,1%	13,4%	11,1%	11,4%
If YE <= FP: spread with closest comparable	0,5%	0,7%	2,0%	3,8%	6,2%	4,8%	0,3%	-	1,1%	-	-	0,7%
If YE <= FP: highest spread with closest comparable	0,162											
If YE <= FP: lowest spread with closest comparable	0,000											
If YE <= FP: highest minimum spread with closest comparable	0,015											
If YE <= FP, does the comparable stays the same?	Yes:	8	(50%)	No:	8	(50%)						
Outlier	1	(1981)					Performance:	Medium				

### LBO CF USA (realized funds 1984-2001)

Fund Age (Years)	2	3	4	5	6	7	8	9	10	11	12	All (max 14 Y)
Year end performance = final performance	44,44%	61,11%	61,11%	55,56%	66,67%	72,22%	77,78%	88,89%	88,89%	88,89%	88,24%	72,22%
If YE = FP: average spread with three other categories	-3,1%	-7,0%	-16,7%	-32,2%	-36,2%	-33,4%	-23,5%	-15,9%	-11,1%	-8,1%	-6,5%	12,8%
If YE = FP: spread with closest comparable	1,3%	3,7%	11,0%	21,1%	19,9%	15,4%	10,0%	6,7%	4,8%	3,5%	3,1%	6,7%
If YE <= FP: spread with closest comparable	0,3%	1,2%	0,6%	0,7%	1,2%	4,9%	4,1%	2,1%	1,9%	1,5%	0,5%	0,6%
If YE <= FP: highest spread with closest comparable	0,110											
If YE <= FP: lowest spread with closest comparable	0,000											
If YE <= FP: highest minimum spread with closest comparable	0,010											
If YE <= FP, does the comparable stays the same?	Yes:	3	(33%)	No:	6	(67%)						
Outliers	2	(1987,1988)					Performances:	Medium (x2)				

### VC CF EMEA (realized funds 1981-2001)

Fund Age (Years)	2	3	4	5	6	7	8	9	10	11	12	All (max 14 Y)
Year end performance = final performance	50,00%	50,00%	75,00%	55,00%	50,00%	70,00%	70,00%	75,00%	90,00%	95,00%	94,74%	70,45%
If YE = FP: average spread with three other categories	-1,4%	-0,8%	-2,4%	-6,6%	-12,0%	-15,6%	-21,3%	-27,4%	-30,6%	-33,0%	-33,2%	14,3%
If YE = FP: spread with closest comparable	0,9%	0,6%	0,9%	3,2%	6,7%	5,6%	11,5%	17,1%	18,0%	18,1%	15,7%	7,6%
If YE <= FP: spread with closest comparable	0,4%	0,6%	0,5%	2,1%	3,3%	5,5%	5,2%	4,9%	3,1%	1,8%	0,3%	1,1%
If YE <= FP: highest spread with closest comparable	0,134											
If YE <= FP: lowest spread with closest comparable	0,000											
If YE <= FP: highest minimum spread with closest comparable	0,016											
If YE <= FP, does the comparable stays the same?	Yes:	3	(27%)	No:	8	(73%)						
Outliers	6	(1989, 1991, 1993, 1996-98)					Performances:	V High, Medium (x5)				

### LBO CF EMEA (realized funds 1984-2001)

Fund Age (Years)	2	3	4	5	6	7	8	9	10	11	12	All (max 14 Y)
Year end performance = final performance	52,94%	64,71%	47,06%	58,82%	70,59%	88,24%	76,47%	82,35%	82,35%	82,35%	87,50%	72,19%
If YE = FP: average spread with three other categories	-3,1%	-3,1%	-2,4%	-4,9%	-15,5%	-24,3%	-21,1%	-14,0%	-10,1%	-7,8%	-6,3%	8,6%
If YE = FP: spread with closest comparable	1,9%	1,5%	1,4%	3,1%	4,7%	3,1%	5,4%	4,1%	3,0%	2,4%	2,1%	2,4%
If YE <= FP: spread with closest comparable	0,7%	0,5%	1,2%	0,9%	2,6%	2,7%	0,8%	1,0%	1,2%	0,9%	0,8%	0,5%
If YE <= FP: highest spread with closest comparable	0,047											
If YE <= FP: lowest spread with closest comparable	0,000											
If YE <= FP: highest minimum spread with closest comparable	0,006											
If YE <= FP, does the comparable stays the same?	Yes:	4	(36%)	No:	7	(64%)						
Outliers	4	(1984, 1986, 1987, 1991)					Performances:	Low, V high, Low, Medium				

### *The predictive power of the J-Curve*

Exhibit 17 provides a summary of our initial categorization, and the results from the model. The model is then used to predict the performance of active funds, and to identify the closest comparison in terms of VY. Outliers and problematic vintages are indicated.

Exhibit 18 provides probabilities that the performance categories identified at the end of each year are the same as the final performance of the VY. For the four strategies/geographies considered, it appears that below two years the prediction is below or around 50%. At the end of the third year of activity, for the four strategies/geographies considered, the category of performance can predict the final performance at 50% (VC EMEA) to 65% (LBO EMEA rate). Year 4 exhibits an increase of this probability (except for EMEA LBO, which actually falls below 50%). From Year 5 and on, the percentage increases systematically (if the impact of outliers and defective vintages is excluded).

When the year-end performance category is the same than the final performance category, the spread of correlations with the three other categories and with the closest category increases significantly in Year 4 (US strategies) and 5 (EMEA strategies).

When the year-end performance category differs from the final performance category, the spread of correlation with the closest comparable (the category of final performance) peaks in Year 6 for US VC and Year 7 all other strategies/geographies. It is on average 6.2% for US VC (the highest correlation spread is 0.16), 2.7% for US LBO (0.11), 3.3% for EMEA VC (0.13) and 2.6% for EMEA LBO (0.05).

Overall, the spread with the closest comparison if the year-end performance category differs from the final performance is on average from 0.5% (EMEA LBO) to 1.1% (EMEA VC). If the year-end performance category is the same as the final performance, the average spread is then from 2.4% (EMEA LBO) to 11.4% (US VC). In practical terms, this means that if the spread of the year-end performance of a given active US VC fund with its closest comparison is beyond 6.2% (or 0.162) then the final performance has an above-average likelihood to be the final performance category. If the performance spread is at or above 11.4%, then in effect, the performance category has above a 60% chances to be the final one.

## **CONCLUSION, DISCUSSION AND LIMITS**

### *Summary of findings and discussion*

The approach taken has been to use only cash-flows and build a model which defines historical return patterns and categories which are in turn used to identify the return potential of active funds. The purpose of the model is not to immediately attribute a fund to a precise category but to reduce the time needed to attribute it to a given category – and hence to reduce the solvency costs associated with investing in PE. In this respect, the model is helpful. During the first 2 to 5 years of activity, correlations with return categories will progressively exclude certain return patterns and then a given vintage will lean towards the most likely category of return it belongs to. It is only after 6 to 8 years of activity that a final attribution can be done.

Testing it with individual vintages, and then with top and bottom quartile returns for each vintage, correlation tests hold true. Unreported tests of the most representative VYs of return categories for US VC and of the top and bottom quartile funds of these most representative VYs have been undertaken to mimic the situation of individual funds (and their correlation to

the four categories). VY 1985, representing the “Medium” returns category, was excluded from the overall samples (all categories are recalculated). Snapshots of its cash-flows were taken for each year after the first two years. In Year 4, the hypothesis of “Very high” returns is excluded. After 6 years of activity, the most likely possibility is “Medium” returns. VY 1990 representing “High” returns category is tested with the same procedure. The correlation tests hint at a “Medium” return until Year 6, when the “High” returns appear as the category to which it belongs. Given the fact that 1990 is the only item in the “High” returns category, we could infer that this VY is the one during which the cycle turned from “Medium” to “Very High” returns. VY 1995 representing “Very high” returns was also tested. The most likely return category after 2 years is “Low”. It is only in Year 5 that the “Very high” returns category appears as the one to which it belongs. We test VY 2000, representing “Low” returns. After 4 years, the “Very high” returns category was excluded; after 6 years, “High” returns were excluded and “Low” seem to be the most probable.

The same reasoning is applied to top quartile funds of the same VYs (unreported). For top quartile VY 1985, the vintage correlates the closest with the average VY 1985. In Year 4, the “Medium” returns scenario appears as the highest correlation. It is in Year 6 that this is definitely confirmed. For 1990, though top quartile, the same conclusions apply for the average of the vintage. As the correlation switches from “Medium” to “High”/“Very High” after five years, we can only confirm that 1990 might have been a transition vintage. For 1995, the correlations fall below 0.6 during two years of activity, hence confirming that a specific phenomenon has affected this vintage in 1998 and 1999 (which were the peak of the technology bubble). In Year 5, the category appears as “Very high” returns. For 2000, “Very high” returns are excluded from Year 4; then “High” returns from Year 5. At this point, “Low” appears and remains the most probable scenario until Year 8, when it switches to “Medium”.

The same reasoning is applied to bottom quartile funds of the same VYs. For 1985, in Year 4, the “Very high” returns scenario is excluded. In Year 5, the highest correlation is with “High” (this is not confirmed with the most representative VY, as 1985 remains the highest one). In Year 7, “High” is excluded and in Year 8, “Low” becomes prevalent. Overall, the closest VY is the “Low” returns year 1999 (0.97), which appears clearly in Year 7. For 1990, unlike for top quartile and the average, the bottom quartile vintage excludes very high returns after 3 years, high returns after 4 years and medium returns after 7 years. Though being among the bottom quartile of “High” returns, it hence appears as a “Low” returns group of funds. For 1995, the bottom quartile of “Very high” returns have been excluded from the “Very high” returns after three years, then from “High” returns after 5 years; and they then belong to the “Medium” category before drifting to “Low” in year 9. For 2000, “Very high” returns have been excluded after 3 years, then “High” returns after 34 years. At this stage, the correlation with “Low” returns increases and remains prevalent.

Assessing the reliability of performance predictions also confirms that prior to two years of activity, the predictive power is not high enough (below 50% chances of accurate prediction of the final performance). Year 3 and 4 deliver a good idea of what the vintage will *not* be and progressively what it will be. After Year 5, the performance attribution appears as rather solid and only improves with time.

This paper has several practical and theoretical implications. It also raises several limitations, and certain conclusions would support further developments.

### *Use for academic purposes*

There is little prospect in the short to mid term of the emergence of a comprehensive database recording cash-flows measured in a consistent and coherent way of all the PEFs worldwide. Our approach deals with data uncertainty by measuring the distance of a given stream of cash-

flows from a series of ideal-type cash-flows (the return categories). The model deals with partial data, lack of precision and can function with incomplete cash-flows.

Cash-flows are reliable and verifiable, much more difficult to manipulate than NAVs<sup>20</sup>. By using cash-flows, we identified that the time to break-even for a fund is a first predictor of performance: the earlier a VY breaks even, the better the overall performance. This finding would need further research beyond US VC and LBO.

### *Use for practitioners and regulators*

For practitioners (LPs) and regulators, the outcomes of the model are different. What matters to LPs is assessing the performance by GPs, and the ability of the latter to replicate performances in the future. This is during the fund selection phase.

Once committed, LPs need to determine the progress of the GPs as compared to expectations and their peer group. A dynamic model using cash-flows is more suitable than reference to absolute past performances. Regulations with dynamic solvency ratio calculations for institutional LPs require these models. We have offered a benchmarking methodology which can be used independently of returns assumptions.

This model can be used to sort vintages early (after two to three years) and exclude certain return scenarios. This should in turn reduce the adverse effects of solvency ratios, notably because the maximum and average losses can be predicted statistically based on our categories (and for example Weidig and Mathonet, 2004). The illiquidity of the asset class becomes less problematic if return scenarios can be sorted after two years of activity.

The model might support a more active management of existing portfolios of PE funds. The secondary market of PEFs stakes will probably initially make the most of this performance attribution model. LPs will be able to better negotiate the discounts/premia on their existing stakes, and securitize mature portfolios. Should the model be validated and adopted, the dynamics of pricing on PE's secondary market could change significantly.

Regulators have the opportunity to reduce the cost of capital associated with investing in PE. Illiquidity in PE is not necessarily associated with uncertainties and lack of transparency: cash-flows tell us a story since the early age of funds. This should be reflected in solvency ratios. "Value at risk" frameworks can integrate the output of our model.

### *Limitations*

A certain stability at the helm of GPs was assumed. Terms and conditions determining funds cash-flows and the behavior of GPs towards these cash-flows<sup>21</sup> were assumed as remaining materially the same. Changes of LPA terms may change the outcome of the model. This model might also be sensitive to cash-flows strategies tentatively signaling a strong performance by reaching the break-even point faster<sup>22</sup>.

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20 Either voluntarily, or under valuation methods requirements (such as the "fair market value" and the mark-to-market, which are ill adapted to private equity).

21 A clear example is a switch in the calculation of management fees in the investment period from a percentage of the fund size to a percentage of the capital paid in. The incentive would therefore be to deploy the capital faster and change the cash-flow patterns.

22 See VYs 2004, 2005 and 2006 for US LBO (Exhibit 8) and 2002, 2003, 2004 and 2007 for EMEA LBO (Exhibit 12) as an illustration.

## THE PREDICTIVE POWER OF THE J-CURVE

PE being still largely an American activity, a significant share of the results is drawn from data collected on this market, limiting the generalization of the conclusions. Even though EMEA data is patchy<sup>23</sup>, comparisons exhibit differences in the shape of J-Curves, time to break-even and the overall signification of the different return categories identified. Cash-flows labeled in USD for EMEA funds could explain some erratic data. As performances exhibit wave patterns, a possible bias in favor of EMEA LBO funds might be cycle-related.

Ideal-type categories rely on past cash-flows: some might become irrelevant (“Very high” returns for EMEA VC) and others can emerge (that the model, with its explicit construction on the measure of distance of VY to categories, could help identify).

Is the model applicable to single funds? This question remains partially unsolved due to a lack of access to cash-flows of individual funds. The issue was tackled by testing individual vintages and quartiles. So far, the model confirms its predictive power, but a thorough testing with individual cash-flows would be necessary to confirm the conclusions.

At the current stage, the model does not differentiate between intrinsic and idiosyncratic behaviors of cash-flows. This is not a major limitation: funds are affected by the overall macro-economic conditions, as well as by the skills of the fund managers.

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# IMPRESSION MANAGEMENT – AN EMPIRICAL INVESTIGATION OF THE USE OF GRAPHS IN ANNUAL REPORTS IN EUROPE

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**Abstract.** *Graphs are a powerful tool which affect a reader's impression and decision making because they attract attention, support the human ability to perceive information, and "a picture" tends to stay in the memory longer than plain numbers. Previous studies emphasize that graphs in annual reports have a long tradition of being distorted and misleading in order to give a more favourable impression of the company's performance. This paper contributes to the knowledge of impression management by answering the quest for more longitudinal studies while focusing on not only KfV but all variables depicted in annual reports in a fragmented reporting area like Europe. This study therefore uses annual reports over a period of 7 years (2006, 2009 and 2012) of the top 50 European companies listed in the fortune 500 index resulting in 4,683 graphs for analysis. The study reveals that two of the three major ways of how impression management normally occurs can be detected: selectivity (companies tend to be selective in the topics and the length of the times series depicted) and graphical measurement distortions (31.7% of the graphs show unproportional changes in their magnitude according to RGDI). Overall, our findings for European companies are consistent with previous studies that companies primarily produce graphs in order to influence the perception of their stakeholders in a favourable way rather than to display the topics in accordance with the "true and fair view" that is requested by the IASB.*

**Keywords:** *graphs, annual reports, impression management, visual analyses*

## Introduction

Impression management examines the attempts of managers to influence the interpretation of financial reports. A significant aspect of the literature on this topic deals with the communication of financial and other information via graphs (Merkl-Davies et al. 2011). Graphs rely on spatial intelligence which addresses the most dominant of all five senses – the visual sense. Graphs attract attention and support the human ability to see information rather than to read (Pennington and Tuttle 2009, Contani and Maclaren 2008, Lurie and Manson 2007, Renshaw et al. 2003).

Prior research on impression management in annual and sustainability reports has focused on the choice of graphs and on their construction (Hrasky 2012, Jones 2011, Stanton et al. 2004). It can be concluded that graphs in financial communication have

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a history of being misused (Beattie et al. 2008), which means that they are often designed in a way that deliberately misinforms readers about the underlying data (Ball 2011). Companies manipulate graphs in order to give a favourable impression of their performance by applying distortions (e.g. use of a non-zero axis or the use of a third dimension for two dimensional displays) or by selecting time sequences that support a favourable trend rather than an unfavourable one (Cho et al. 2012, Penrose 2008). However, there is a lack in current research of graphical distortions in reports of European companies and a quest for longitudinal studies to get deeper insights into this matter (Beattie et al. 2008).

The focus of this paper therefore lies on the use and abuse of the presentation mode “graph” and its role within the topic of impression management in the top 50 European companies listed in the fortune 500 index. Our paper not only replicates previous research regarding the relationship between financial performance and graphical financial disclosure but also extends it by separately analyzing the financial graph disclosure choices of every single company over a period of seven years (2006, 2009, 2012) while not only focusing on KfV but on all variables graphed. This paper explores the relationship between the magnitude of corporate performance and graphical distortions, in order to determine if and how such distortions are used as an impression management tool.

The main contribution of this research thus adds to our understanding of how and why companies in Europe choose to use and misuse graphical representation in annual reports. The search for additional influences that describe the mostly inconsistent use of graphs provides meaningful insights into management communication with stakeholders. Furthermore, the economic crisis serves as an interesting basis to analyze how companies deal with extreme situations of downturn in 2009 as well as upturn in 2012. Additionally, this paper helps stakeholders to recognize impression management and traps in annual reports provided by graphical distortions.

This paper is structured as follows: the next section summarizes previous studies dealing with graphical displays as a tool to communicate with external stakeholders (e.g. annual reports or sustainability reports) that builds the basis upon which testable hypotheses are developed. The third section describes the applied research method and in section four findings of the empirical investigation are presented. The fifth section summarizes and concludes the paper.

### **Theoretical background and hypotheses of the study**

#### *Annual Reporting*

There are many forms of communication between corporate management and various interested stakeholders, however the annual report seems to be the most common and the most powerful one (Uyar 2009). It can be seen as a traditional statutory-based formal communication device that consists of a comprehensive data base of past corporate economic activity and future perspectives (Courtis 1998). The annual report provides information on vision, mission, ownership structure, sales, earnings, market share, etc. and therefore enables the confirmation, revision and formation of readers' expectations about the corporation that arouses their interest (Uyar 2009, Courtis 1998). An annual report is basically divided into two parts: the financial section, which is strongly regulated, and the narrative section, which does not need to follow

any specific regulations, and thus varies in length, depth and appearance (Penrose 2008). The annual report has a significant influence on shareholders' assessment

whether to buy, keep, or sell stocks (Penrose 2008) and with a growing international focus of companies as well as shareholders, it has gained importance over time.

Along with the increasing importance of annual reports as a communication device, companies transformed their reports from a rather boring financial document to a colorful marketing instrument (Beattie et al. 2008). Various formats, such as tables, narratives, photographs and graphs, are used and the number of photos as well as graphical representations in a company's voluntary disclosure have risen continuously over the last few decades (Dilla and Javrin 2010). Previous studies indicate that the selection of the topics depicted in the narrative section and the chosen design is influenced by the company's current financial situation (Penrose 2008). If the financial performance influences the way graphs are depicted or if they are depicted at all is analyzed in studies of impression management (Beattie et al. 2008).

### *Graphical Use in Annual Reports*

Graphical use is said to enhance readers' understanding of financial data as it communicates information on a more holistic level by depicting trends and relationships. Graphs are also said to speak a universal language and are therefore useful in breaking down barriers of language and culture (Cho et al. 2012, Frownfelter-Lohrke and Fulkerson 2001). Furthermore, readers of annual reports may only take 15 minutes for skimming through reports and stop where graphs are, because they are likely to capture the attention due to their salient characteristics (Penrose 2008, Beattie and Jones 2000b). Thus, people who want to analyze the company's financial situation rely greatly on graphs according to conducted experimental investigations (Pennington and Tuttle 2009, Stanton et al. 2004, Beattie and Jones 2002).

The word *graph* defines a visual illustration of quantitative data (Frownfelter-Lohrke and Fulkerson 2001). There is a consensus among scientists in the field of information visualization that graphs are superior to text and also to tables in situations where the identification of overall trends and patterns is more emphasized than the acquisition of individual data values (e.g. Beattie and Jones 2008, Penrose 2008, Frownfelter-Lohrke and Fulkerson 2001). Uyar (2009) summarized in his literature review the following advantages of the use of a graphical representation:

- Graphs are more user-friendly than tables.
- Graphs increase the speed of decision making and managers prefer them to tables and text.
- Graphs can be remembered better than tables.
- Through graphs, comparisons between numbers become more obvious, and the data relationships are easier to conceptualize and remember.
- Graphs are visually appealing and an effective means of communicating financial information to shareholders, regulators, and the media.
- No matter who the user is, graphics are useful for summarizing financial (e.g. sales, net income) and non-financial (employee turnover, number of accidents) information.

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Therefore, in voluntary presentations depicting graphs is of great importance and graphs are used in about 70-100% of corporate annual reports of large companies (e.g. Hrasky 2012, Jones 2011, Dilla and Janvrin 2010, Uyar 2009). Results of previous studies show, that graphical use has become universal. Table 1 summarizes the results of empirical studies on annual and sustainability reports conducted in various countries.

Table 1: Prior studies of graphics in financial voluntary disclosure (annual and sustainability reports)

Study	report type	Country	Reviewed reports	% of reports including graphs	Average graph number per report
Cho et al. (2012)	sustainability reports	US	77	77%	11
Hrasky (2012)	sustainability reports	Australia	41	100%	13
Jones (2011)	sustainability reports	UK	63	86%	11
Dilla and Janvrin (2010)	annual report	US	184	Ca. 70%	N/A
Uyar (2009)	annual report	Turkey	96	75%	9
Beattie et al (2008)	annual report	UK	1989: 240 2004: 94	1989: 79% 2004: 99%	1989: 6 2004: 7
Frownfelter-Lohrke and Fulkerson (2001)	annual report	US vs non US companies (NYSE)	US: 135 Non US: 135	79%	Non US: 9.4 US: 7.5
Beattie and Jones (2000a)	annual report	Australia, France, Germany, Netherlands, UK, US	300	Australia: 90% France: 88% Germany: 84% Netherlands: 90% UK: 82% US: 90%	8
Courtis (1997)	annual report	China (Hong Kong)	1992-93: 364 1994-95: 327	1992-93: 38% 1994-95: 35%	1992-93: 5.3 1994-95: 5.0
Mather et al. (1996)	annual report	Australia	143 listed companies 44 not listed companies	Listed: 83% Not listed: 73%	8.9

These studies show a constantly rising number of graphs depicted in the voluntary presentation in annual and sustainability reports of large companies in different countries and all of the studies indicate a substantial variation in the use of graphs across firms. However, one finding in this context seems to be universal: the bigger the company is in size (revenue) and the more profit the company makes, the more graphs are disclosed by the company in its annual report (Cho et al. 2012, Uyar 2009, Beattie et al. 2008). Dilla and Janvrin (2010) even state in this context that the absence of graphs tends to conceal poor performance and that using a lot of graphs makes good performance more salient to the user. Out of these findings the first testable hypotheses emerge:

*Hypothesis 1a: The larger a European company is in size (measured by revenue) the higher the number of graphs depicted.*

*Hypothesis 1b: A positive performance of a European company influences the number of graphs depicted positively.*

Beattie et al (2008) found empirical evidence that although the use of graphical displays rises altogether the use of graphs for key financial variables (or KfV: sales/turnover, income, earnings per share, and dividends per share) has stagnated or declined in the UK in recent years. However, it is mentioned that this could be due to the fact that the performance of the companies declined in general. Dilla and Janvrin (2010) support this reason for the decline in visualizing KfV as they find evidence that KfV correlate positively with the performance of the company. Managers seem to be keener to mention changes in their magnitude of the variables if the message that can be sent is a positive one.

*Hypothesis 2a: A positive performance of a European company influences the number of graphs depicting KfV positively.*

*Hypothesis 2b: The relative number of KfV in European companies is declining despite a positive corporate performance.*

Besides the frequency of graphical displays in financial reports, previous studies also focus on graph types used to gain a deeper understanding of graphical use in financial communication (e.g. Jones 2011; Uyar 2009; Courtis 1997). Prior research shows that bar and column charts represent the majority of graphical visualization in many countries supporting the argument that time sequences of financial variables are the focus of these reports (Jones 2011). Beattie et al (2008) conclude in their paper that the type of graph used for KfV “has normalized further toward the column or bar graph”. The incidence of each graph type surveyed in previous studies can be found in table 2.

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Table 2: Graph types used in annual reports investigated in prior studies

Study	Number of analyzed graphs	Bar	Column	Pie or ring	Line	Others
Cho et al. (2012)	857		column and line graphs: 66.5%, rest: 33.5%			
Hrasky (2012)	517	N/A	most common	second most common	N/A	N/A
Jones (2011)	693	16.2%	49.9%	23.2%	7.1%	3.6%
Dilla and Janvrin (2010)	N/A	N/A	N/A	N/A	N/A	N/A
Uyar (2009)	826		67.9%	18.9%	9.4%	2.5%
Beattie et al (2008)	465		84.0%	N/A	5.0%	11.0%
Frownfelter-Lohrke and Fulkerson (2001)	2,270		69.0%	14.0%	15.0%	2.0%
Beattie and Jones (2000a)	1989: 1,426 2004: 649		more than 80% 97%	N/A	4.5% 3.0%	11.2%
Courtis (1997)	1992-93: 745 1994-95: 578	5% 7%	67% 58%	19% 25%	4% 9%	5% 1%
Mather et al. (1996)	236	N/A	N/A	N/A	N/A	N/A

Along with the argument of previous investigations that KfV's are declining over time, the number of bar and column charts depicting time sequences is expected to decline as well, and on the other hand the proportion other graphs types such as pie, line or others should rise as the number of graphs depicting other variables than KfV rises. These findings lead to the next testable hypotheses:

*Hypothesis 3a: A negative performance of a European company influences the number of bar and column graphs to a greater extent than other graph types when focusing on KfV.*

*Hypothesis 3b: The proportion of other graph types (not bar and column) is rising as the number of graphical displays is rising for non KfV in annual reports of European companies.*

Summarizing this chapter, it can be concluded that graphical use is universal and that the overall number of graphical displays is rising while graphs depicting KfV seem to be declining. The number of graphs depicted is influenced to a great extent by company performance and the country the company is situated in.

## *Impression Management and Graphical Distortions*

Graphical use can, however, be misleading. Graphs can be depicted in such a way to manipulate the perception of the underlying data, for instance through selection of graph type, colour, scale, and size (Penrose 2008) or by a selective choice of the graphed variables. This leads to the main topic of this paper – graphical use for impression management.

Graphs represent considerable potential for impression management because they have a higher impact as a communication device than narratives. This is due to the fact that graphs rely on spatial intelligence (Dilla and Janvrin 2010).

Impression Management occurs due to the motivation of the management to dictate the corporate reporting agenda and present a self-serving view of corporate performance. Therefore it has a high potential to conflict with the purpose of accounting, which is to present the annual performance of a company fairly in a, neutral and unbiased manner (Beattie and Jones 2000a). Stanton et al. (2004) show in an experiment that impression management significantly alters decisions especially when recipients have limited knowledge of business administration and finance.

In particular there are three major ways in which impression management can occur in annual reports: (1) by selectivity, (2) by the use of graphical measurement distortion and (3) by the use of presentational enhancement (Beattie and Jones 2008). Methods used to measure graphical distortions and impression management used in previous studies are summarized in the next table and the three major areas of impression management are discussed in the chapters below.

Table 3: Measures used for impression management in prior studies

Study	method used	analyzed graphs	result
<b>Cho et al. (2012)</b>	count of graphs, trend, RGDI (relative graph distortion index)	all graphs	79.1% represent favourable trends 21.9% are distorted
<b>Hrasky (2012)</b>	count of graphs	all graphs	graphs are used by non sustainability-driven companies for legitimization
<b>Jones (2011)</b>	GDI (graph distortion index), RGDI, trend	column, line, bar with scaled specifiers	74.2% present favourable trends 57.6% are distorted
<b>Dilla and Janvrin (2010)</b>	relationship between performance and graphs	KFV (sales, income, EPS, DPS)	companies with larger decreases in KFV are less likely to disclose these in graphs
<b>Uyar (2009)</b>	correlation between graphic disclosure and corporate performance/company size	KFV (sales, income, EPS, DPS) and all graphs	no significance between firm performance (share), positive correlation between size/profitability
<b>Beattie et al (2008)</b>	count of graphs, GDI	KFV (sales, income, EPS, DPS, cash flow) and all graphs	49% are distorted
<b>Frownfelter-Lohrke and Fulkerson (2001)</b>	count of graphs, design of graphs, GDI	all graphs	average GDI US: 0.81 average GDI non-US: 1.73
<b>Beattie and Jones (2000a)</b>	count of graphs, GDI	KFV (sales, income, EPS, DPS, cash flow) and all graphs	20% are distorted
<b>Courtis (1997)</b>	lie factor, segmental discrepancy index (for pie charts)	KFV (sales, profit, EPS, DPS) and all graphs	38% are distorted, 25% misuse of creative visual effects, 20% misuse of descending sequences in pie charts
<b>Mather et al. (1996)</b>	GDI	KFV (turnover profit, EPS, DPS) and all graphs	29.7% are distorted, 15.5% represent an exaggeration and 14.2% an understatement

### (1) Selectivity

The first area – selectivity – is described as choosing to depict graphs only when they shed a positive light on the company, resulting in a variation of financial and non-financial variables graphed as well as varying in the length of time series (extension or contraction) depicted when comparing annual reports of one company in time (Cho

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et al. 2012). In this regard Dilla and Janvrin (2010) point out “each company must decide each year whether to continue its current graph disclosure policy or change the status quo with respect to using KfV graphs. Thus, it is important not only to examine voluntary graph disclosure at a given point in time, but also to look at changes in graph disclosure.” Furthermore, Schrand and Walther (2000) found out that managers tend to select a reduced number of prior periods as a comparative benchmark in order to report an increasing trend rather than a decreasing one.

Prior research generally found evidence for selectivity, for instance Steinbart (1989) in the US and Beattie and Jones (1999, 1992) in the UK and Australia. Results of Dilla and Janvrin (2010) for companies in the US give further insight beyond the directional relationship by examining the magnitude of change in performance and graph usage. They found, in accordance with earlier research, that companies with declining KfV are less prone to disclose these results in the form of graphs. However, selectivity in previous literature is only focused on KfV in annual reports (Mather et al. 2000).

*Hypothesis 4a: European companies will be selective in their presentation of information resulting in differences in the depicted topics when analyzing different years.*

*Hypothesis 4b: European companies will be selective in their presentation of information using varying time series in order to give a favourable rather than an unfavourable impression of corporate performance.*

### (2) Graphical Measurement Distortions

The second area – graphical measurement distortions – gained the most interest with regard to impression management and the use of graphs in financial reporting (Cho et al. 2012). Measurement distortion means that the physical representation of the numbers is not proportionate to the underlying data (Tuft 1986). In combination with impression management previous studies examine whether or not graphical distortions are used to overstate a positive trend and to understate a negative trend in order to shed a positive light on the company's performance.

Empirical investigations show that measurement distortions can be used by companies in a systematic way to emphasize good and to understate poor performance (see table 3). Additionally, experimental investigations examining the impact of measurement distortions on readers of financial report show that measurement distortions result in altered decisions (Penrose 2008). Pennington and Tuttle (2009) even show that not only the first impressions of the presented data is more likely to be wrong, but more importantly that error rates more than double when memorizing the data.

Measurement distortions mentioned by Uyar (2009) are non-zero baselines or missing vertical axes, numbers and gridlines. According to Beattie and Jones (1992) non-zero axes, broken axes, or non-arithmetic scales are used to overstate a positive trend or to understate a negative trend of the underlying data.

*Hypothesis 5a: Measurement distortions are used in annual reports of European companies more often to highlight favourable information and to disguise unfavourable information than vice versa.*

*Hypothesis 5b: There is a correlation between the degree of graphical distortion and the performance of companies in Europe.*

*Hypothesis 5c: Measurement distortion is applied more for KfV than for other variables by companies in Europe.*

### (3) Presentational Enhancement

The third area – presentational enhancement – deals with altering the design of one or more graphical components that highlight or shade certain features of the graph. This can be done for instance by graph shape, three-dimensional effects to stimulate a particular optical illusion, the use of multiple vertical axes with different scales, not showing data values, reversing time-series, inconsistent use of color, and the use of colors so that matching data labels to the appropriate data marker is not possible (Uyar 2009, Beattie and Jones 2008).

Beattie and Jones (2002) focused on the effect of graph slope by conducting a laboratory experiment as well as an examination of graphical formatting choices in the UK. Graphs with a large slope seem to portray more intensive growth than those with small slope parameters, and the empirical study reveals that graphs in annual reports deviate materially from the optimum slope parameters (Beattie and Jones 2002).

*Hypothesis 6a: Presentational enhancement is used in annual reports of European companies more often for graphs with unfavourable information than for favourable information.*

*Hypothesis 6b: Presentational enhancement in annual report of European companies is negatively correlated to company performance.*

## Research Methods

### *Sample*

The annual reports of the largest 50 companies in Europe (ranked by their revenue - Fortune 500 for the fiscal year 2012) are analyzed in this study. All reports are prepared in accordance with the International Financial Reporting Standards (IFRS) or US-GAAP. In order to be included as part of our sample, all companies' annual reports of the years 2006 (before the economic crisis), 2009 (during the economic crisis) and 2012 (after the economic crisis) must be available for download. Companies that underwent a major merger or demerger during that time period are excluded due to a lack of comparability resulting in 44 companies per year that is 132 annual reports included in this study.

A comprehensive study analyzing every single graph in detail (total of 4,683 graphs) is conducted and a checklist for data collection is applied. Descriptive data on the graphs is collected in terms of frequency of graph used per analysed year, topics graphed, formats used, years graphed, and distortions applied. Detailed rules and definitions are followed to ensure consistent and objective evaluation. The generated data were double-checked for accuracy.

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## *Measures for Graphical Use in Annual Reports*

Each annual report is examined to determine the number and types of graphs used. Graph types are categorized as column, bar, line, pie, combined (mostly columns and lines displayed in one graphical display) and others. These categories were applied because column, bar, line, and pie charts are identified as typical graph types used in annual reports (Beattie et al. 2008) and the other two categories are used in order to be able to collect data for all graphs used. The category *others* includes, for example, waterfall, bubble, plot, candle stick charts etc.

In order to analyze graphed financial information by topic, categories are used (sales, earnings, environment, employee, share, cash flow, market etc.). Additionally information on the development (time comparisons) of KfV (EPS, DPS, sales, earnings, cash flow) as common in other studies concerning graphical use in financial communication is gathered as well (Dilla and Janvrin 2010).

## *Measures of Impression Management and Graphical Distortions*

As stated in the section about the theoretical background of the study, there are three main topics in relation to graphical distortions: selectivity, graphical measurement distortion, and presentational enhancement. These topics are used for the evaluation in this study. Their operationalization is explained in the following paragraphs:

### (1) Selectivity:

For selectivity a comparison of topics visualized between years within one company as well as between companies is used to find out whether continuous reporting (e.g. visualizing the same information) is more important than showing only positive trends.

Furthermore, the number of years depicted in a time series is compared within one annual report, within one company over time and between companies to find out whether graphs are manipulated in order to show only positive trends which can be achieved by reducing or enhancing time series. Depending on the nature of the topic a positive or a negative trend can be identified if the first and the last data point of the graph reflect a positive or a negative deviation. This means if a topic such as sales increases it is good news and a topic such as environmental pollution is good news if it decreases. Topics such as investments in research and development or number of employees are not used for trend evaluation as a decrease or increase in these topics cannot definitely be allocated to a positive or a negative trend.

### (2) Graphical Measurement Distortion:

As assessed in the theoretical background a lot of previous studies use either GDI (graph discrepancy index) or RGDI (relative graph discrepancy index) for evaluating graphical measurement distortion (e.g. Jones 2011, Beattie and Jones 2008, 2000a, 1992, Courtis 1997, Steinbart 1989,). In this study we use both in order to compare results and get a deeper understanding of graphical distortions in annual reports, however for deeper analyses only RGDI is used.

GDI is an advanced measure by Tylor and Anderson (1986) of Tufte's lie factor (1983) and both of them measure how many of the graphs used are intended to mislead the audience (by using a broken axis).

$$GDI = \left[ \frac{a}{b} - 1 \right] * 100 = \left[ \frac{[a - b]}{b} \right] * 100$$

$$\text{whereas } a = \frac{g2 - g1}{g1} \% ; \quad b = \frac{d2 - d1}{d1} \%$$

$g1$  and  $g2$  represent the heights of the first and the last column in the graph and  $d1$  and  $d2$  stand for the corresponding data values. Hence the equation for  $a$  and  $b$  result in the percentage change (trend) in both data and graph. The GDI helps in identifying if trends are exaggerated or understated.

However, when using GDI difficulties arise, mostly related to the mathematical properties of the GDI and its parameters (percentage trend). “In general, mathematical expressions in the form of a fraction are not very robust and the focus on a parameter such as the trend results in high sensitivity to small changes in the data” (Mather et al. 2005). Therefore the measure RDGI is introduced by Mather et al. (2005). The RGDI measures the height of the last column as it is graphed relative to the height at which it should have been graphed.

$$RGDI = \frac{g2 - g3}{g3}$$

$$\text{whereas } g3 = \frac{g1}{d1} * d2$$

$d1$  = value of first data point (corresponding to first column)

$d2$  = value of last data point (corresponding to last column)

$g1$  = height of first column (graph)

$g2$  = height of last column (graph)

$g3$  = the correct height of last column (if plotted accurately)

A positive RGDI results from exaggerating a positive and from understating a negative trend (Cho et al. 2012). The RGDI is a consistent measure and is proportional to the level of distortion, whereas the GDI is not. Therefore it is possible to quantify the magnitude of the distortion. Additionally, when evaluating RGDI also data points between the first and the last point can be used for calculations to generate a maximum distortion resulting in the  $RGDI_{\max}$  (Mather et al. 2005).

Two benchmarks for evaluating GDI have been suggested. Tufte (1983) suggests that material distortion is presented when the GDI exceeds 0.05. Beattie and Jones (2002) concluded from an experiment that “the vast majority of users would not notice a 5 per cent level of measurement distortion whereas a 20 per cent level would be noticed. At the 10 per cent level, the evidence is more mixed.” The established 5% cut-off is also used in this study. For RGDI Matther et al. (2005) took the established and frequently used 5% cut-off from GDI and calculated an equivalent cut off which is 2.5% and used for this study. As in other studies the effect of graphical distortion is

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described as favourable when improving performance is exaggerated and vice versa when negative performance is understated.

In this study, measurements for GDI and RGDI were recorded to the nearest millimetre. For graphical distortions all graph types except pie graphs are used.

### (3) Presentational enhancement:

For presentational enhancement descriptive data on the use of three-dimensional displays for two-dimensional data, multiple vertical axes with different scales, reversing time-series, and the use of colors that make it impossible to match data labels to the appropriate data marker is collected.

## Results and Discussion

This study contributes to the topic of impression management regarding graphical representation as it extends and replicates previous research. The study relies on previous research as it uses accepted measures for the defined areas of impression management, however, it extends the body of literature by answering the quest for more longitudinal studies as well as the quest for an extension of the investigated variables from only KfV to all variables graphed. This extension results in an analysis of 4,683 graphs, which is one of the largest samples ever investigated.

Additionally this study focusses on a geographical area that shows little empirical research. Different countries within Europe already have been analysed, however, no study researched the region Europe as a whole. A reason for that could be, that Europe is fragmented and local GAAP might influence graph use and detecting similarities and significant results therefore could be difficult. However, finding significant results in a fragmented sample strengthens the validity of results of the tested hypotheses.

In this part of the paper the hypotheses are clustered into the two main topics used in the literature review (graphical use in annual reports and impression management) and discussed with literature to show similarities and dissimilarities when presenting the findings.

### *Graphical Use in Annual Reports*

Beattie et al (2008) discovered in their analyses a trend of increasing size (number of pages) of annual reports in the UK. They reported an increase of pages from an average of 26 in 1965 to 75 in 2004 and pointed out a sharp increase in page count in the later periods of their investigation. Results of this study support their findings and show that the upward-trend concerning the amount of financial disclosure in annual reports has continued and the size of the annual reports increased from an average of 229 pages in 2006 to 295 pages in 2012.

All analysed companies use graphs in their reports in the fiscal years of 2009 and 2012. In 2006 all except one company includes at least one graph resulting in 97.7% graph use. The findings of this study demonstrate that the percentage of the biggest companies in Europe using graphical representations is equal or (slightly) above the percentages of other countries, e.g. Australia (100%), the UK (86%), Turkey (75%) and the US (70%), China (35%) (see table 1).

Graphical disclosure is used for both financial and non-financial information and the total number of graphs displayed in the analysed sample is 4,683. The average

number of graphs per report for the fiscal years 2006 and 2009 is 32.6 and in 2012 it rises to 41.3 and frequencies as well as the used categories are shown in the next table. The most frequently graphed variables are sales, earnings and stock development.

Table 4: Variables used by fiscal year

variables	2006		2009		2012		sum	
sales	170	12%	200	14%	215	12%	585	12%
earnings	158	11%	134	9%	208	11%	500	11%
stock performance	179	12%	155	11%	171	9%	505	11%
cash flow	14	1%	20	1%	27	1%	61	1%
employees	149	10%	118	8%	232	13%	499	11%
environment	90	6%	48	3%	96	5%	234	5%
market	84	6%	95	7%	111	6%	290	6%
others	590	41%	662	46%	757	42%	2009	43%
<b>sum</b>	<b>1,434</b>	<b>100%</b>	<b>1,432</b>	<b>100%</b>	<b>1,817</b>	<b>100%</b>	<b>4,683</b>	<b>100%</b>

The graph types used are listed in table 5. As indicated in previous studies, also in this study column charts are the most common graph type used, followed by pie charts (see table 2). Additionally, it can be observed that the relative use of column chart rises (from 36.4% to 42.0%) while the relative use of pie charts as well as line graphs declines (from 27.6% to 24.5% respectively from 12.1% to 9.0%).

Table 5: Graph types used by fiscal year

graph types	2006		2009		2012		sum	
column	524	37%	584	41%	764	42%	1,872	40%
line	174	12%	152	11%	164	9%	490	10%
bar	277	19%	218	15%	339	19%	834	18%
pie	394	27%	406	28%	446	25%	1,246	27%
combined	33	2%	32	2%	53	3%	118	3%
others	32	2%	40	3%	51	3%	123	3%
<b>sum</b>	<b>1,434</b>	<b>100%</b>	<b>1,432</b>	<b>100%</b>	<b>1,817</b>	<b>100%</b>	<b>4,683</b>	<b>100%</b>

Chi-square analysis of changes in graph type use shows significant results at a  $p < 0.01$  level for the relationship between graph types used and fiscal year, however, Cramers V indicates a weak relationship between the tested variables (0.057). Results when comparing company and graph type show a stronger relationship, indicating that graph types used are influenced by the company to a greater extent.

The correlation between the company size and the number of graphs that is found in other studies can be confirmed ( $p < 0.05$ ). For the largest companies in Europe, however, it shows a low correlation (0.186). Almost the same result is found for the correlation between net profit and graphics count (Pearson correlation 0.201 at a  $p < 0.05$  level). Therefore hypothesis 1a and 1b can be confirmed, but the results are less strong than indicated in other studies.

These presented results (table 4 and 5) include all graphs depicted in a report while most of the previous studies concerning graphic use in financial reporting only analyse KfV that show time series (Beattie et al. 2008). Numbers concerning this type of information are shown in the next table.

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Table 6: Key financial variables by fiscal year

KFV	2006	2009	2012	sum
sales	56 23%	91 34%	95 30%	<b>242 29%</b>
earnings	117 47%	110 42%	149 47%	<b>376 46%</b>
EPS	16 6%	10 4%	9 3%	<b>35 4%</b>
DPS	49 20%	38 14%	46 15%	<b>133 16%</b>
Cash Flow	10 4%	15 6%	15 5%	<b>40 5%</b>
<b>sum</b>	<b>248</b>	<b>264</b>	<b>314</b>	<b>826</b>

The development of KFV represents only 17.6% of all graphs depicted as the majority of graphical representations show information about production, market share or ownership structure. Compared to other studies, the stake of KFV is distinctly smaller (e.g. Beattie et al. 2008). The most common depicted key financial variable is earnings followed by sales, which also show an increasing trend from 2006 to 2012. However, the use of EPS and DPS is declining.

Hypothesis 2a and 2b deal with KFV. A relatively strong positive correlation (0.417) between the number of KFV graphed and the performance of the company can be found and therefore hypothesis 2a can be confirmed ( $p < 0.01$ ). However, there is no indication for a reduction of key financial variables in relation to graphs with other information (KFV's relative share is for 2006: 17.3%, for 2009: 18.4% and for 2012: 17.3%). Hypothesis 2b is rejected for the investigated time period.

Hypothesis 3a and 3b deal with graph types used for key financial variables. An overview is presented in table 7.

Table 7: Graph types used by fiscal year for KFV

graph types	2006	2009	2012	sum
column	155 63%	201 76%	237 75%	<b>593 72%</b>
line	22 9%	12 5%	11 4%	<b>45 5%</b>
bar	61 25%	43 16%	53 17%	<b>157 19%</b>
combined	7 3%	4 2%	10 3%	<b>21 3%</b>
others	3 1%	4 2%	3 1%	<b>10 1%</b>
<b>sum</b>	<b>248 100%</b>	<b>264 100%</b>	<b>314 100%</b>	<b>826 100%</b>

Column and bar charts show a significant ( $p < 0.01$ ) and relatively strong correlation to the company's performance (0.404), while the other graph types do not. This result supports Hypothesis 3a that the number of bar and column charts is influenced by the company's performance to a greater extent than other graph types.

For hypothesis 3b the proportion of other graph types to the number of graph types is analysed. A significant correlation (0.297 at a  $p < 0.01$  level) indicates that the proportion of other graph types rises as the number of graphs rises in general. Therefore hypothesis 3b can be confirmed as well.

The following table summarizes the tested hypotheses and the results of the chapter graphical use in annual reports:

Table 8: Overview to the results of the tested hypotheses for graphical use in annual reports

Nr.	Hypothesis	Result
1a	The larger a European company is in size (measured by revenue) the higher the number of graphs depicted.	Confirmed
1b	A positive performance of a European company influences the number of graphs depicted positively.	Confirmed
2a	A positive performance of a European company influences the number of graphs depicting KfV positively.	Confirmed
2b	The relative number of KfV in European companies is declining despite a positive corporate performance.	Rejected
3a	A negative performance of a European company influences the number of bar and column graphs to a greater extent than other graph types when focusing on KfV.	Confirmed
3b	The proportion of other graph types (not bar and column) is rising as the number of graphical displays is rising for non KfV in annual reports of European companies.	Confirmed

### *Impression Management and Graphical Distortions*

#### (1) Selectivity

Selectivity can be achieved by varying the topics depicted between different reports to show more favourable trends than unfavourable ones. Many studies demonstrate selectivity by indicating that graphs with favourable trends occur significantly more often than those indicating unfavourable trends (Beattie and Jones 2000b). In general charts can show positive, negative or neutral developments. In the year 2006, 71% showed graphs displaying a positive trend, in 2009 this ratio decreases to 47% and in 2012 it increases to 53%. Significantly fewer graphs show negative trends: 17% in 2006, 37% in 2009 and 29% in 2012. A binominal test supports the argument of significantly more graphs displaying a positive development rather than a negative one.

Chi-square for graph type is significant at a  $p < 0.01$  level indicating that graphs vary between years. When comparing the relationship between these variables within each company, Cramers V shows a relatively strong relationship (0.381), indicating that companies influence the topics graphed. When examining each company individually using chi-square it can be detected that 11.4% of the companies use graphs continuously over the years, 47.7% of the companies do not show a significant difference between years because two periods show a continuous graph use (in all cases either 2006 or 2012 shows differences), and 40.9% show significant differences between the years 2006, 2009 and 2012 ( $p < 0.05$ ).

For KfV no significance can be detected between the fiscal year and the variables graphed, indicating that the topics graphed are rather similar over the years. Again the relationship between KfV and the company is stronger than those of KfV and fiscal year (Cramers V 0.400). However, further analysis shows that only 27.3% of the companies depict the same topics over the period of investigation. Most of the

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other companies show changes in one year (38.6% in 2006, 4.5% in 2009, and 11.4% in 2012). The hypothesis 4a, that companies will be selective in their presentation of information resulting in differences in the depicted topics can be confirmed for all graphs used and when only taking a look at KfV.

For further analysis within the topic selectivity, we focus only on graphs displaying time series. For a time series the comparison of at least two sequences is necessary. Of the 4,683 graphs 58% or 2,715 graphs fulfil this requirement (826 in 2006, 830 in 2009, and 1,059 in 2012) and support the statement of Jones (2011) that annual reports have a heavy focus on pure time-related financial variables. This study also supports his findings concerning a low rate of graphs depicting a time series of more than five years. He stated that 93.5% of the graphed time sequences show a time line up to five years and only 6.5% show more than five years. Results of this study can be found in table 8.

Table 9: Depicted years by fiscal year

depicted years	2006		2009		2012		sum	
1 year	57	7%	67	8%	70	7%	194	7%
up to 5 years	706	85%	703	85%	911	86%	2,320	85%
more than 5 years	64	8%	59	7%	78	7%	201	7%
<b>sum</b>	<b>827</b>	<b>100%</b>	<b>829</b>	<b>100%</b>	<b>1,059</b>	<b>100%</b>	<b>2,715</b>	<b>100%</b>

The most common time frame is three years (34%) followed by two years (32%) and five years (15%). No correlation between the company's performance and the average years depicted can be detected. When comparing the average years depicted between 2006, 2009 and 2012 no significance can be identified using ANOVA.

However, individual analyses (by company) show significant changes in the length of time sequences depicted in 40.9% of the companies in the three periods of investigation. So the next step is to check if these significant changes are a result of coincidence or indicated. Trends are evaluated in relation to the years depicted. Up to three years 72% of the graphs show a positive and only 28% a negative one. A binominal test shows a significance between groups of  $p < 0.01$ . Between three and five years the proportion of favourable trends is slightly higher (75%) and again the binominal test shows significance at a  $p < 0.01$  level and for graphs depicting more than five years the proportion of favourable trends increases up to 86% ( $p < 0.01$ ). These results indicate, that companies only show longer time sequences if they can present a positive rather than a negative trend. Hypothesis 4b that companies are selective when depicting time series in order to depict a positive rather than a negative trend can be confirmed, especially with regard to longer time series depicted.

## (2) Graphical Measurement Distortion

The next part of the analysis focusses on whether graphical distortions are used as a tool of impression management. Different proportions of graphical distortions can be found when using the different measures (GDI, RGDI and  $RGDI_{max}$ ). All measures are calculated in order to be able to compare results to other studies:

Table 10: Overview of the results on measurement distortions based on three measures

	distorted graphs	in %	mean	cut-off
<b>all variables</b>				
GDI	1,485	43.2%	773.2	5%
RGDI	1,087	31.7%	481%	2.5%
$RGDI_{max}$	1,147	33.4%	504%	2.5%
<b>base</b>	<b>3,434</b>			
<b>KFV</b>				
GDI	428	51.8%	388.3	5%
RGDI	282	34.1%	231%	2.5%
$RGDI_{max}$	294	35.6%	248%	2.5%
<b>base</b>	<b>826</b>			
<b>other variables</b>				
GDI	1,057	40.5%	929.1	5%
RGDI	805	30.9%	568%	2.5%
$RGDI_{max}$	853	32.7%	592%	2.5%
<b>base</b>	<b>2,608</b>			

The results indicate that in absolute figures more graphs depicting other variables are being distorted than graphs showing KFV. However, in relative figures KFV show a higher proportion of graphs being distorted (differences are not significant). Additionally, the mean level of distortion for KFV is lower than that of graphs depicting other variables. For this reason, hypotheses 5c, that measurement distortions are applied more frequently for KFV, can be rejected.

For further analysis the RGDI is used because it is the more robust measure in respect of mathematical issues (Mather et al. 2005). More than half of the distorted graphs are column charts (54%), followed by line graphs (22%) and bar charts (19%). The rest of the distortions are applied in combined graphs (graphs showing columns and lines in one chart) (3%) and in other graph types (like waterfall charts) (1%). A low correlation between performance of the company and the number of graphical distortions can be detected (Pearson correlation 0.176 at a  $p < 0.05$  level) and for this reason hypotheses 5b that there is a correlation between the degree of graphical distortion and the performance of companies in Europe can be confirmed.

As graphs were identified as being distorted, the next step is to categorize distortions as favourable or unfavourable when depicting trends. For analysis a binominal test is used, which is consistent with prior studies. For the sample as a whole as well as for depicting KFV, distortions are used significantly more often when positive trends are depicted ( $p < 0.01$ ).

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The development of the use of graphs with graphical distortions within the period of investigation is shown in the next table.

Table 11: Development on the use of graphical distortions in Europe based on the RGDI

RGDI Scores	2006		2009		2012		sum	
total graphs	1,434		1,432		1,817		<b>4,683</b>	
pie graphs	394		406		446		<b>1246</b>	
	<b>1,040</b>		<b>1,026</b>		<b>1,371</b>		<b>3,437</b>	
RGDI >= -25	42	4%	42	4%	46	3%	<b>130</b>	<b>4%</b>
-25 < RGDI <= -5	29	3%	60	6%	104	8%	<b>193</b>	<b>6%</b>
-5 < RGDI <= -2,5	19	2%	20	2%	39	3%	<b>78</b>	<b>2%</b>
-2,5 < RGDI <= 2,5	715	69%	730	71%	902	66%	<b>2347</b>	<b>68%</b>
2,5 < RGDI <= 5	34	3%	18	2%	36	3%	<b>88</b>	<b>3%</b>
5 < RGDI <= 25	70	7%	80	8%	142	10%	<b>292</b>	<b>9%</b>
RGDI > 25	131	13%	76	7%	99	7%	<b>306</b>	<b>9%</b>
<b>sum</b>	<b>1,040</b>	<b>100%</b>	<b>1,026</b>	<b>100%</b>	<b>1,368</b>	<b>100%</b>	<b>3,434</b>	<b>100%</b>
* three graphs without axis and numbers								

Graphs are much more likely to be materially exaggerated than materially understated. Changes in the magnitude can especially be seen in the upper extreme (in 2006, 13% of the graphs exceed a material distortion of 25% while in 2009 and 2012 it decreases to 7%) and the proportion of materially understated graphs rises continually from 9% in 2006 to 14% in 2012.

Additional evidence for the use of impression management when using measurement distortion can be found when examining if increasing trends are overstated or if negative trends are understated. Negative values of the RGDI for increasing trends indicate an understatement while decreasing trends indicate an exaggeration. The next table shows the results of this analysis:

Table 12: Bias in the use of materially distorted graphs

Trend	Nature of Distortion	RGDI		p
Increase	Exaggeration	>2.5%	84%	0.00
Decrease	Understatement	>2,5%	16%	
Increase	Understatement	<=-2.5%	54%	0.689
Decrease	Exaggeration	<=-2.5%	46%	

Positive trends are significantly more often exaggerated than understated, however, negative trends are almost equally often exaggerated and understated. Therefore hypothesis 5a, that measurement distortions are used more often to highlight favourable trends and to disguise unfavourable ones can be partly confirmed.

### (3) Presentational Enhancement

The following presentational enhancements that alter the design of graphical components could be found in the sample of this study:

Table 13: Presentational enhancements used by fiscal year

presentational enhancement	2006		2009		2012		sum	
three-dimensional effect	38	10%	37	9%	6	1%	81	6%
multiple axis	32	8%	33	8%	37	8%	102	8%
reversing time-series	16	4%	11	3%	63	14%	90	7%
vertical time-series	180	47%	135	33%	184	40%	499	40%
similar color use	81	21%	81	20%	98	21%	260	21%
vertical gridlines	34	9%	112	27%	70	15%	216	17%
<b>sum</b>	<b>381</b>	<b>100%</b>	<b>409</b>	<b>100%</b>	<b>458</b>	<b>100%</b>	<b>1,248</b>	<b>100%</b>

Using chi-square analysis all but the use of multiple axes show significant differences between years ( $p < 0.05$ ). The use of presentational enhancements rises in 2009 from 26.6% to 28.6% and then declines to 25.2% in 2012. The highest decline in use can be detected when looking at the use of three dimensional displays and increases can be detected by the use of reversing time-series and the use of vertical gridlines.

Presentational enhancements are significantly more often used for favourable information (72% of the time) than for unfavourable information (28% of the time). Therefore hypothesis 6a stating the opposite can be rejected. Additionally, no correlation between the use of presentational enhancements and company performance can be detected. Hypotheses 6b can also be rejected, indicating that the use of presentational enhancements is by accident and not deliberately used to misinform readers of a report.

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The following table summarizes the tested hypotheses and the results of the chapter impression management:

Table 14: Overview to the results of the tested hypotheses for impression management

Nr.	Hypothesis	Result
4a	European companies will be selective in their presentation of information resulting in differenced in the depicted topics when analysing different years.	Confirmed
4b	European companies will be selective in their presentation of information using varying time series in order to give a favourable rather than an unfavourable impression of corporate performance.	Confirmed
5a	Measurement distortions are used in annual reports of European companies more often to highlight favourable information and to disguise unfavourable information than vice versa.	Partly confirmed
5b	There is a correlation between the degree of graphical distortion and the performance of companies in Europe.	Confirmed
5c	Measurement distortion is applied more for KfV than for other variables by companies in Europe.	Rejected
6a	Presentation enhancement is used in annual reports of European companies more often for graphs with unfavourable information than for favourable information.	Rejected
6b	Presentation enhancement in annual reports of European companies is negatively correlated to company performance.	Rejected

## Conclusion and further research

The question of the deliberate use of impression management has arisen in the form of manipulation hypotheses. The detection of impression management is based on the idea that managers follow a self-serving motivation in their reporting strategies. A self-serving motivation in this context means that the management presents itself in a more favourable light than the underlying data would permit. A powerful tool in this context is the use and the design of graphical representations.

In this study the 50 biggest companies in Europe based on the fortune 500 index are used for investigation. This research answered the call from the literature for more longitudinal studies and for investigation into the reporting strategies with regard to the use and abuse of graphical representation of companies in European countries. Additionally an extension to previous studies is made by investigating all graphed variables instead of only focussing on KfV in order to get additional insights into graph use in annual reports.

Graph use in annual reports of European companies is universal and the number of graphs depicted rises constantly over the period of investigation although a general downward trend (the economic crisis) is included. This highlights the importance of graphical representation in financial communication such as annual reports. However, graphics in Europe are used inconsistently and a wide variety of topics exist. Similarities for the topics graphed can be detected neither between different companies nor between years over the period of investigation. However, an overall trend in graphic type use towards the column and bar charts can be identified. The highest influence on the topics and the graph types used are the companies itself,

indicating that some sustainability exists. However, Cramers V indicates only a moderate relationship (between 0.3 and 0.5). Further research into the influencing variables is necessary to determine the motivation of the companies to disclose information. Possibilities therefore would be the country they are located in or the sector or branch they are working in. Additionally it would be interesting to look at small companies in Europe and how their reporting strategies match or collide with the concept of impression management.

For impression management for two of the three major areas clear evidence can be detected and therefore the use of impression management in European companies can be confirmed. Selectivity, both in topics and time sequences depicted, as well as graphical measurement distortion are used as tools for impression management while presentational enhancements are not. An overwhelming number of favourable rather than unfavourable trends are displayed within the report and distortions are applied more often in favour of the company than otherwise. For example longer time sequences (more than five years) almost exclusively depict favourable trends (86%) and graphs are much more likely to exaggerate positive trends than to understate them. With regard to non KFV in this context it can be found that the use of measurement distortions is similar to KVF (around 30%), however the magnitude is much higher (568% in comparison to 231%).

Overall these findings are consistent with previous studies that companies primarily produce graphs in order to influence the perception of their stakeholders rather than to display the topics in accordance with the “true and fair view” that is requested by the IASB. The findings also provide additional insights especially with regard to non KFV.

Depending on such results a request for regulations or at least for a responsible use of graphs in financial communication arose in theory and in practice. To support this request Brugess et al. (2008) conducted a survey of recipients of financial statements resulting in a high awareness of the problem and a demand for regulations. However, standard setters like the IASB or the FASB have not yet released any particular information on how to use graphs correctly and avoid misleading information. This study should provide a solid base for further discussions in this regard as companies still use graphs to give a favourable impression of the company and deliberately misuse them in order to achieve this aim.

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## Appendix

Table 15: Full list of companies

Rank	Company	Industry	Headquarter	Size (revenue)
		Sector	Industry	
1	Royal Dutch Shell PLC	Energy	Oil, Gas & Coal Netherlands	467,153
2	BP PLC	Energy	Oil, Gas & Coal United Kingdom	375,580
3	Total SA	Energy	Oil, Gas & Coal France	200,061
4	Volkswagen AG	Consumer Discretionary	Automotive Germany	192,676
5	Glencore PLC (merger in 2012)			
6	Gazprom OAO	Energy	Oil, Gas & Coal Russian Federation	5,002,902
7	E.ON SE	Utilities	Utilities Germany	133,997
8	Eni SpA	Energy	Oil, Gas & Coal Italy	127,220
9	ING Groep NV	Financials	Insurance Netherlands	42,644
10	Daimler AG	Consumer Discretionary	Automotive Germany	114,297
11	AXA SA	Financials	Insurance France	90,126
12	Allianz SE	Financials	Insurance Germany	101,760
13	BNP Paribas SA	Financials	Banking France	44,476
14	GDF Suez (Merger in 2008)			
15	Carrefour SA	Consumer Staples	Retail Consumer Staples – France	76,789
16	Statoil ASA	Energy	Oil, Gas & Coal Norway	706
17	Banco Santander SA	Financials	Banking Spain	43,675
18	EXOR SpA (merger in 2008)			

19	Siemens AG	Industrials	Electrical Equipment	Germany	76789
20	Assicurazioni Generali SpA	Financials	Insurance	Italy	62,838
21	Lukoil OAO	Energy	Oil, Gas & Coal	Russian Federation	139,171
22	Enel SpA	Utilities	Utilities	Italy	82,699
23	HSBC Holdings PLC	Financials	Banking	United Kingdom	56,702
24	Credit Agricole SA	Financials	Banking	France	32,514
25	Tesco PLC	Consumer Staples	Retail – Consumer Staples	United Kingdom	72,035
26	BASF SE	Materials	Chemicals	Germany	78,729
27	Société Générale SA	Financials	Banking	France	29,904
28	Bayerische Motoren Werke AG	Consumer Discretionary	Automotive	Germany	76,848
29	ArcelorMittal (merger in 2007)				
30	Nestlé SA	Consumer Staples	Consumer Products	Switzerland	92,186
31	Metro AG	Consumer Staples	Retail – Consumer Staples	Germany	66,739
32	Electricite de France SA	Utilities	Utilities	France	72,729
33	Muenchner Rueckversicherungs AG	Financials	Insurance	Germany	51,969
34	Telefónica SA	Communications	Telecom	Spain	62,356
35	Peugeot SA	Consumer Discretionary	Automotive	France	55,446
36	Deutsche Telekom AG	Communications	Telecom	Germany	58,169
37	Repsol SA (partly nationalized in 2012)				

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38	Deutsche Post AG		Industrials	Transportation & Logistics	Germany	55,512
39	Groupe BPCE (merger in 2009)					
40	Deutsche Bank AG		Financials	Banking	Germany	32,242
41	Vodafone PLC	Group	Communications	Telecom	United Kingdom	46,417
42	Robert GmbH	Bosch	Consumer Discretionary	Automotive	Germany	52,464
43	Barclays PLC		Financials	Banking	United Kingdom	19,199
44	ThyssenKrupp AG		Materials	Iron & Steel	Germany	38,559
45	RWE AG		Utilities	Utilities	Germany	53,227
46	EADS NV		Industrials	Aerospace & Defense	France	56,227
47	Landesbank Baden-Wuerttemberg		Financials	Banking	Germany	41,091
48	Lloyds Banking Group PLC	Banking	Financials	Banking	United Kingdom	38,906
49	Rosneft OAO		Energy	Oil, Gas & Coal	Russian Federation	1,526
50	Unilever PLC		Consumer Staples	Consumer Products	United Kingdom	51,324

# ACCOUNTABILITY MECHANISMS OF MANAGERS AND ITS IMPACT ON PERFORMANCE AND VALUE CREATION: COMPARATIVE ANALYSIS (FRANCE, GERMANY AND THE UK)

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**Abstract.** *We study the impact of accountability mechanisms on the corporate performance and the value creation in three European countries. Based on a sample of 284 French, British and German companies quoted on stock exchanges comprising 2272 annual reports examined during the period 2005 – 2012, this study aims to explain the differences between the companies practices within these three countries regarding the accountability mechanisms. First, we examine, for the sample size, the relationship between the characteristics of accountability mechanisms and the financial performance. The results show that the good functioning of the board of directors and the specialized committees are determinant factors in accountability mechanisms of managers which will in turn have positive effect on the company's performance and the value creation. Furthermore, our results show that the high quality of ethical environment within the company has great impact on managers' ethical behavior and their decisions making processes. We also study the relationship between the management characteristics (management networks, compensation packages, experience, and age) and the financial performance. Our results highlight the existence of a negative relation between the management networks, age, and high remuneration (positive in the case of experience) and the company's performance. This study should have academic and practical contributions particularly for regulators seeking to improve the companies' practices and organizational functioning within capital market economy.*

**Keywords:** *Management, corporate performance, accountability mechanisms, corporate governance, value creation.*

## Introduction

Major theoretical and empirical contributions provide evidence about the unfavorable impact of recent financial crises in capital market economy. Being considered as one of the major sources of the financial crises, the corporate functioning and corporate governance mechanisms have been under scrutiny by regulatory bodies (Soltani 2014). In this respect, the management accountability, the corporate ethical values and the way managers conduct their responsibilities should be of great importance. This responsibility requires more transparency and communication within and outside the company. This will likely affect the quality of control mechanisms implemented by the company and contribute the achievement of its objectives. Furthermore, the financial crises revealed the inadequate control mechanisms and gaps in the current system of governance of companies (Soltani 2007). Several countries such

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as France, Germany and the United Kingdom have taken the regulatory measures to strengthen the responsibility of the manager to improve their governance systems within corporations. They have adopted new laws by taking into consideration the long-term corporate objectives and shareholder democracy and stakeholders' interests. We observe that these countries focus on one main objective, which is to create the regulations requiring the managers to report accountability of their activities and also on the quality of the control mechanisms and its impact on the company's future performance.

This study will focus on several essential managerial issues and corporate governance which we believe are determinants factors in better functioning of the corporations within the European context. The organization of the paper is as follows. First, we present the review of the literature on related matters. Second section presents the methodology and sample size. The third section presents the comparative analysis of the results. The final section provides the concluding remarks of the study, its contributions and limitations.

### Literature Review

#### *The determinant factors regarding manager's responsibilities*

Researches in accounting and in finance concerned a variety of mechanisms of the responsibility such as the characteristics of the board of directors, the composition of the shareholding, the risk management and more recently we find mechanisms bound to the ethical dimension to know the creation of a code of ethics and the existence of Ethics committee in the sense of most of the company. These mechanisms with strong ethical conditions can lead to a general tendency for the managers to act in the interests of their companies and the shaping of a responsible behavior.

##### *1. The characteristics and the composition of board of directors/supervisory board*

The characteristics and the composition of the board of directors or the surveillance of the company are presented in the literature as the most important determining mechanisms of the responsibility of company manager. Researches showed that the active participation of corporate governance by the mechanism of the board of directors (in term of its size, its independence, its meetings and its specialists committees) is the most useful for the management of a company and more susceptible to be looked for when a company is in trouble.

The independence of the board of directors: most of the empirical studies confirm that the presence of the independent directors within the board of directors is a big advantage to improve the performance and the wealth of the company, Mishra and Nielsen (2000), Daily (1995), Kirkbride and Letza, (2005), Ezzamel and Watson, (1998). Of other part of the literary watch the absence of the relation between the company's performance and the presence of the external administrators in its Executive Board. Agrawal and al. (1991) made a study out of a 118 companies quoted in stock exchange for period from 1975 till 1984 and they showed that there is no link between the presence of external administrators and the performance of the company. In this research, we consider that the strong presence of the independent directors within the company favors a behavior responsible for the manager and led to a good control, what is translated by an improvement of the profitability of the company and its value creation. Concerning the size of the board of directors (board meeting), we find three areas of research: the first axis supports the idea that the board where there is administrators significant number can control well the behavior of the manager, what to

guarantee then a better decision-making, Kini and al (1995), Pearce and Zahra (1992), Dalton and al (1999). On the contrary, the second area of research encourages the idea according to which the small size of the board of directors allows the company to realize a good performance level and to create more value, Jensen (1993) and Yermack (1996). Finally, Schnake and William (2008) show the absence of relation between these two variables.

On the other hand few researches have studied the link between the annual number of Board meetings and the performance of the company. In the large-sized boards, the increase of the number of meetings favors an exchange mattering between the administrators who could improve the performance and the value creation in the company, Conger and al (1998). On the contrary, Prinz (2010) supposes that more the number of Board meetings is more brought up the performance of the company and its wealth are low.

At the level of the company structure, we find three main forms, first of all the monistic structure of the board of directors where there is an accumulation of the functions of Chairman of the Board and the function of managing director and it is the case of most of the French companies quoted in stock exchange. In 2005 Godard and Schatt observe that a monistic structure with CEO strengthens the value creation, then the dualistic structure (the functions of control and management are separated) and at the end the monistic structure with separation of the functions. Several studies show a negative relation between the functional accumulation and the performance, such as Pi and Time (1993) and Donaldson and Davis (1991).

## *2. Specialized Committees of the board of directors*

The good functioning of board of directors depends widely to the specific committees such as the audit committee, which makes sure the relevance and the performance of the accounting processes and then the good internal control (through the check of the financial information and easy access of the administrators to all the important information to estimate well the general health of the company). The committee of remuneration which plays a major role in the determination of the total remuneration for the managers and the members of board of company. Klein (1998) asserts that these specialized committees should consist of the most willing of members of the board to realize the objectives of the company. Since 2003, the European Commission has paid particular attention to corporate governance and specialized committees (Soltani and Maupetit 2013a). More, the characters of these committees such as the independence, the size and the frequency of the meetings can constitute a determining mechanism of the responsibility of manager, which could improve the performance and the value creation in the company. It is the reason why several European codes (for example, the Green book in 2003) assert that these committees have to make compose mainly independent directors.

Forbes and Milliken (1999) show that the big size and the good presence of the members of these committees strengthen the social links, which allow afterward exchanging better the information and their various managerial skills. Consequently, this contributes to a better efficiency of the board and improves the profitability and the wealth of the company. This idea was generally confirmed by the empirical study realized by Klein en1998, where he found a relation positive between these committees and the performance of the company. On the other hand, Browen and Caylor (2004) confirm the absence of the relation between the independence of audit committee and the performance of the company. They also notice that the expenses of audit are negatively connected to performance indicators.

Concerning the committee of remuneration and its role in the company, in 1998, Conyon and Peck made a study pressing on a sample listed of 94 companies between 1992 and 1994

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to specify the nature of link between the existence of this committee within the company and the level of manager's general remuneration for the direction. The results present only the existence of this committee impact positively the level of management remuneration for the direction. They also show a positive relation between the percentage of external administrators and the level of remuneration. On the other hand, Anderson and Bizjak (2003) find that the presence of the manager within the committee of remuneration leads him to be less paid.

### *3. The composition of the shareholders' structure*

The composition of the shareholding of the company presents a determining mechanism of the responsibility of manager, which leads to a more effective control over the behavior of manager especially in case the company meets a low level of performance and value creation. The shareholders have to exercise an active control over the company, to have a dialogue with his board of directors and to exercise their rights. The insensitivity of the shareholders for the surveillance of the governing bodies of companies contributed to irresponsible behaviors. In 2003, the European Commission notices that in the companies where there is a shareholder dominating the implication of the minority shareholders can be difficult, this shareholder can influence negatively the application of good practice of management. To assure the rights of the certain shareholders European countries guard certain seats of the board of directors to the minority shareholders.

At the empirical level, several studies were realized to know what is the link between the types of the shareholding especially the governmental shareholding, the institutional shareholding, the employee shareholding, and the performance of the company. Davies and al. (2005) show a negative impact of the existence of the shareholders (the shareholders are obliged to align their interests with those of the managers and not to jeopardize their business with the company).

On the other hand, Dionne and Triki (2004), Wright and al. (1996) confirm that the existence of the institutional shareholders having more of 5 % the capital decreases the costs of asymmetry of information and obliges the manager to choose a strategy risked to improve the value of the company. Also, Kang and Shivdasani (1995) examine the relation between the presence of the financial institutions and the probability to replace little successful managers. They observe that companies associated with a main bank are more incited to replace the little successful managers and to recruit new managers. Other studies such as Facio and Lasfer (2000) observe that the control exercised by the financial institutions does not improve generally the performance of the company.

Concerning the presence of the employee shareholding and the performance of company, the results of numerous studies concerning this relation are contradictory. Certain studies; Kruse and Blasi (1997) and Jones and Kato, (1995) confirm that the employee shareholding influences positively the performance of the company. He appears to play a leading part to solve conflicts of interests between the employees and the shareholders (especially the managers) and to strengthen the efficiency of control of the board of directors. On the contrary, other studies end in a negative relation between the employee shareholding and the performance, for example the study of Faleye and al (2006) presents that the companies where the employee shareholding detains more than 5% of capital have a lower performance than the other companies.

#### 4. *Risk management*

The smooth running of management system of risk and control set up by the company plays an important role to assure a better management of the company. Considers us that the existence of an effective system within the company can have a positive relation with the level of the performance and the value creation. In this frame the presence of a committee in charge of the risk management can be more effective in the management. Furthermore, recently in various countries we find this committee among specialists committees of board of directors.

Other new way of managing the risks and the various social requirements is the organizational display to face the environmental uncertainty. By examining the successes and the failures of the transparency programs in the United States, David Hess (2005) shows that the social reports can be an important shape of the new governance to reach the stakeholders responsibility. The transparency of the company thanks to these reports is the key of the significant commitment of these stakeholders. Several works focused on the study of the link of causality enter the environmental labeling (the publication of social or environmental report) and the financial performance of the company. The majority observe the presence of a positive link between both components, Simpson and Kohers (2002), Nelling and Webb (2009), Preston and O Bannon (1997). Other studies confirmed a negative relation such as Freedman and Jaggi, on 1988, while Aupperle and al. (1985) did not find a significant link.

#### 5. *Corporate ethics*

During the last years the literature on the ethics of company exploded in volume and in importance. Several researches show that the main source of the various crises is strongly bound to considerations of ethics (despite the various made changes of regulations). To realize the good governance, it is necessary to take into account the social, cultural, ethical and environmental aspects and it depends strongly in the capacity of the company and the managers to satisfy the needs for the various stakeholders. Of same Booth and Schulz (2004), Rutledge and Karim (1999) show that a set of strong ethical conditions can lead to a general tendency for the administrators to act in the interests of their companies. The assertion of agency theory, where the managers continue to make economic decisions based only on their own interests is not supported by these studies. So the most important implication of these researches is that the creation of a solid ethical environment represents a viable alternative of control of the behavior.

As stated by Soltani (2013b), among these ethical conditions we find that the presence of an Ethics Committee and the existence of a code of ethics within company constitute a determinant mechanism of the responsibility of manager, which could improve the performance and the value creation in the company. According to Kaptein and Schwartz (2008) a code of ethics is a different and formal document containing a set of prescriptions developed by and for the company to guide the behavior of its managers and its employees. Of the same Betsy Steven (2007) confirm that if the codes are integrated into the organizational culture and communicated effectively, they can influence the behavior and guide the managers in the decision-making. According to the author, the codes are effective instruments of shaping an ethical behavior and to guide the decision-making.

Several works concentrated on the study of differences of contents of the codes of ethics between countries. In 2004, Kaptein studied this aspect in Europe, in America and in Asia. According to him, the European codes concentrated more than 50 % on the environment than the American codes. The honesty is a major theme in the American codes (64 %). On the

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other hand he found that the equity is a less frequent subject in the American codes than in the European and Asian codes. On the other side Arthaud-Day (2005) finds a difference between Germany and France on one hand and the United States on the other hand. In France and in Germany, the biggest consideration of the moral standards answers a customer expectation. On the other hand in the United States, the implementation of ethical standards is an advantage guided by religious values.

### *The characteristics of management (network, experience, age and remuneration)*

In the following sections, we briefly discuss the managerial characteristics from the view point of network, remuneration policy, experience, background and age.

#### *1. Management network*

Within the framework of the partnership approach of the governance, Chareaux (2003) asserts that the manager makes the decisions in interaction with various relational and social networks (for example the board of directors), which influence on his behavior. A manager has more tendency to imitate the behavior of another manager in case he maintains with him a contact which allows to observe and to interpret its behavior. Thus, these relational links of the managers may increase the mimetic behavior and afterward increase the collective cognitive ways of the behavioral finance. This type of bias is a questioning of the initial decision of the decision-maker by aligning itself with the tendency. The fact of belonging to a community of the managers may put early this bias. This questioning of the decision can have a negative impact when it turns out against the initial decisions, but it has a positive impact when it is in compliance with the same decisions. Similarly, Nguyen-Dang (2005) shows that the membership in a social relationship did not prevent a manager from having a bad performance. The same result retained by Kramarz and Thesmar (2006) confirms that companies guided by the managers benefiting from social network were less successful on average.

On the other hand Thomas and Simerly (1995) confirms that the managers having before occupied external activities to the company, in-other-words, in connection with the stakeholders, take into account favor the responsibility of the company. To informal way the manager can establish low relations on his capital with the administrators of companies through the connections between boards of directors, what to allow him to make exchanges with them of the know-how and to take advantage of their work experiences to realize the objective of his company. The study of Carpenter and al. (2001) concerned a sample of 600 big American companies show that the links inter board of the administrators affected positively the performance of the company.

#### *2. Remuneration policy*

The global amount of the remuneration for the company directors is generally decided by the general assembly and determined by the board of directors and the proposals of the committee of remuneration. The works confirmed in a constant way that most of the managers are mainly determined by the potential ensuing advantages activities of the company's successful business. Most of the time the managers are rewarded in proportion to the value that they create at the head of the company (stock-options and bonuses reach the annual levels of profitability, the introductions of new products, to penetrate into new markets, etc.).

Several research works studied the remuneration for the managers, its structure, its way of determination, its variations and its relations with the performance of the company. Most of these researches are based on the theory of agency where the remuneration forms a

mechanism of motivation which encourages the manager to make decisions allows to maximize the wealth of the company and to reduce conflicts of interests between the shareholders and the managers. This argumentation was confirmed by Gomez-Mejia (1992) and Finkelstein and Boyd (1998).

Among the components the most mattering of the remuneration for manager is the use of stock-options. That includes an initial factor of the performance. In 2004, Éliezer and Shivdasani realized a study to test this statistical relation; they show that stock-options impact positively the value of the company and its performance. Of the same Hall and Liebman (1998) confirms that the policy of stock-options composes an effective mechanism for the cost cutting of agency in the company. On the other hand, other part of research shows low statistical relation between both variables (the remuneration and the profitability of the company). In France, Albouy (2004) shows that there is no link between the remuneration for the managers and the profitability of companies listed on the stock exchange in Paris. Accordingly, Pige (1994) found that the relation between performance and remuneration is low and is not significant. The same result was registered in the United Kingdom by Gregg and al (1993). The researchers show that the very high compensation policy of managers does not certainly lead them to be more responsible and successful.

### *3. Experience and age*

The education, the experience and the age of the managers also play an important role. According to Davidson and al (2006) these characteristics can influence not only the individual behavior of manager but also well the way with which it makes the decisions. The fact of having had the same education or to share the same school can give birth to a community which favors several phenomena influence by the soot the managerial decisions of manager. In France, we find that the members of the majority party of the heads of companies are awarded a diploma by a great school such as the polytechnic school and the national school of management. Bertrand and Schoar (2003) show a positive role played by the education and the experience of the managers on the performance of companies. Through scientific and professional capacity of manager, he can direct and manage the different activities of the company in a good direction.

In this context, in 1995 Thomas and Simerly confirmed that the seniority of manager in the company has a positive impact on the consideration of the responsibility. On the other hand Prinz (2010) indicates the absence of the significant relation enter multi German representatives possessing of a educationof doctorate and the general profitability of the company.

Concerning manager's age and its impact on the performance of the company, the previous researches remain rare. The study led by Brickley and al. (1999) watch that the closeness of manager at the retreat age, represents an important stage in its professional life, it leads him to be more successful and responsible to increase its chance to be an independent director in another company later. From behavioral point of view, Borkowski and Ugras (1998) realized meta-analysis of 35 studies which consider the age as important factor and they noticed that attitudes and behavior of old people seem to become more ethical than the people less old.

# ACCOUNTABILITY MECHANISMS OF MANAGERS AND ITS IMPACT ON PERFORMANCE AND VALUE CREATION: COMPARATIVE ANALYSIS (FRANCE, GERMANY AND THE UK)

## Research Methodology

According to the explanatory and causal nature of our problem of research based on the study of the determining mechanisms of the manager's responsibility in the European context, we are in a positivist paradigm which is going to allow us to explain generally the various mechanisms as well as the link of causality between these mechanisms and the performance and the creation of the value in the company.

## Sample and data collection

We chose the three major European economic powers with their most important stock indexes naturally France, Germany and United Kingdom. The ease to make a comparison between these three European countries were among the reasons why we favored these countries, but we can mentioned that every country has specific characteristics in several levels as for example, social levels, cultural and environmental. From these three countries we have removed the following three indices: SBF1201 ; HDAX1102 ; FTSE 1003. Concerning the period of our study it was from 2005 to 2012 for three countries. We chose this period as several reasons: first of all it is the long period of eight years that allows a good evaluation of our studied event, follows this period in known several events by it especially the various monetary and financial world crises.

Our initial sample contains 330 companies quoted on stock exchanges, 120 French companies, 110 German companies and 100 British companies. Because of lack of the necessary information for certain companies our final sample consists of 284 companies with 2272 observations (annual reports) for three European stock indexes. The following table explains more in detail this sample.

**Descriptive analysis of the Sample**

Countries	European stock indices	Number of companies (annual reports reviewed annually)								Total annual reports examined
		2005	2006	2007	2008	2009	2010	2011	2012	
France	SBF 120	95	103	101	98	100	96	94	95	782
Germany	HDAX 110	92	91	93	94	93	94	92	95	744
U.K	FTSE 100	91	91	90	93	95	95	94	97	746

1 This is a stock market index for large French companies traded, it is composed of three major indexes are: CAC40, CAC Next 20 and CAC Mid 60.

2 This is a stock market index for large companies traded in Germany, is composed of three major indexes are DAX, MDAX and TecDAX.

3 This is a stock market index for large UK companies traded; it is composed of one hundred of the best capitalized UK companies listed on the London stock exchange.

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For the data collection, we used several sources; mainly we collected manually most of the data through the annual reports<sup>4</sup> of companies. Other base as Top Management<sup>5</sup>, le Who's Who<sup>6</sup> and the guide of General staffs<sup>7</sup> was used to complete the information on the managers.

Concerning the accounting data, the financier and the data bound to the variables of control, we used several repository bases such as Thomson One Banker, edited by the company Thomson Reuters and which gives information onto the evolution of the prices and the main indications and the constituents, DataStream, edited also by the company Thomson Reuters and which supplies a series of information on stock indexes, economic indicators, actions and obligations, exchange rates and interest rates for more than 100 000 titles in more than hundred and seventy-five countries and sixty markets, Amadeus, who gives information onto the financial situation of about ten millions companies through thirty eight European countries.

## Hypothesis

From our objective of this study, we test the following nine hypotheses concerning of highly-rated determinant mechanisms of the responsibility of manager bound to the company and on the other side the determining mechanisms bound to the function and to the manager's profile.

**Hypothesis 1:** The managers may more listen to the board of directors of the company during the financial crisis and instable conditions. What leads us to suppose that the smooth running of this board; its independence (H1a), its size ( H1b), the number of its meetings ( H1c), the total number of its committees specialists (H1d); favor a behavior responsible for manager, what is translated by an improvement of the performance and the value creation in the company.

H1: the good functioning of the board of directors represents a determining mechanism of the responsibility of manager, which could improve the performance and the value creation in the company.

On the other hand we assume that the accumulation of the functions of Chairman of the Board and of managing director (H1e) favors an irresponsible behavior of manager, what is translated by a low performance and a value creation in the company.

**Hypothesis 2, 3:** The following hypotheses are defined to examine if the characteristics of the audit committee and the committee of remuneration favor a behavior responsible for manager, what is translated an improvement of the performance and the value creation in the company.

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<sup>4</sup> To collect the annual reports of our company we used their website and in the case of French firms there is the website of the FMA (financial markets authority) which provides most French reports.

<sup>5</sup> First bibliographic directors company dictionary.

<sup>6</sup> The Who's Who: A dictionary which presents 22 000 biographies of men and women recognized for their talents and their realizations in all the business sectors.

<sup>7</sup> It is a database that provides information on more than 15,000 decision-makers and more than 750 major French companies.

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*H2: the audit committee; its size (H2a), its independence (H2b), the number of its meetings (H2c); represent a determining mechanism of the responsibility of manager which could improve the performance and the value creation in the company.*

*H3: the smooth running of the committee of remuneration; its size (H2a), its independence (H2b), the number of its meetings (H2c); compose a determining mechanism of the responsibility of manager which could improve the performance and the value creation in the company.*

**Hypothesis 4:** In 2003 the European Commission published the Green book. This shown book, that the behavior of the shareholders is important in the frame or the manager to face his responsibilities. The shareholders have to exercise an active control over the company, to have a dialogue with his board of directors and to exercise their rights. The insensitivity of the shareholders for the surveillance of the governing bodies of companies contributed to irresponsible behavior.

*H4: the composition of the shareholding of the company; actions detained by the government (H4a), institutional investors (H4b) and put on payroll them (H4c); represent a determining mechanism of the responsibility of manager which could improve the performance and the value creation in the company.*

**Hypothesis 5:** The efficiency of management of risk and control, establishes annual reports concerning the financial, accounting and social situation of the company form a determining mechanism of the responsibility of manager which could improve the performance and the value creation in the company.

*H5: the efficiency of the management system of the risks, the presence of a management committee of the risks (H5a) and the publication of reports (H5b) form a determining mechanism of the responsibility of manager which could improve the performance and the value creation in the company.*

On the other hand a too high level of debt of the company leads to an irresponsible behavior of manager, what is translated by a low performance and a value creation in the company. *H5c: A too high level of debt of the company leads to an irresponsible behavior of manager, what is translated by a low performance and a value creation in the company.*

**Hypothesis 6:** Several studies propose that the presence of a solid ethical environment within the company is effective to increase the probability that the managers realize ethical choices in the organizational decision-making and to reduce the tendency to continue with defect projects. *H6: the ethics of the company, the presence of an Ethics Committee (H6a) and the existence of a code of ethics (H6b) constitutes a determining mechanism of the responsibility of manager which could improve the performance and the value creation in the company.*

**Hypothesis 7, 8:** The characteristics bound to the function of manager such as the relational links of manager (the exercise in parallel of a managerial activity in another company) and the system of remuneration for this function can bring the manager to have such behavior which impacts by the soot on the performance and on the value creation of the company. *H7: the exercise jointly of a managerial activity in another company, favors an irresponsible behavior of manager, what is translated by a low performance and a value creation in the company.*

*H8: the efficiency of the system of remuneration for manager forms a determining mechanism of the responsibility of manager, which could improve the performance and the value creation in the company.*

**Hypothesis 9:** Through our study, we are going to test three main characteristics of the profile of manager, the level of training, the age and the experience of the manager. We can thus move forward the following hypothesis: *H9: the characteristics of the profile of*

*manager; good maid level of education(H9a), good experience (H9b); represent a determining mechanism of the responsibility of manager, which could improve the performance and the value creation in the company. On the other hand, we consider that the age of the manager favors an irresponsible behavior of manager, which is translated by a low performance and a value creation in the company (H9c).*

Concerning our variables of controls, we assume that the size and the complexity of the company form a determining mechanism of the responsibility of manager, which could improve the performance and the value creation in the company. While the business sector of the company impact negatively its profitability and its wealth.

## **Choice and definition of variables:**

### *The performance of the company*

The notion of company's performance can be approached through its results, of highly-rated one financial result and accountants and on the other side stock-exchange results. Several ratios based on the data financial and accounting can calculate the financial performance such as, the ratio ROA "Return On Assets" who calculated from the net income divided by the total of the assets of the company; Daines (2004), Adam and Santos ( 2005 ), Eisenberg and al (1998), Lazarides and al (2009); and the ratio ROE "Return On Equity" which equals in the net income divided by the book value of own capital, Bouri and Bouaziz (2007), Brown and Caylor (2004), Lehman and Weigrand (2000). These indicators present limits and none of them allow to approach in a single calculation the performance of the company. Consequently, we are going to study the other indicators, which base itself on the market information of the company to know the Q ratio proposed by Tobin in (1969) who corresponds to the market values who equals in own capital more the financial debts of the company and total conversed by the cost of replacement of assets. We thus chose to measure the performance of the company through these three variables sets.

### *The value creation*

We measure the value creation by means of two countable and financial indicators. By the MTBV (Market To book value) who equal to the market capitalization divided by book value of own capital. This measure was used by several studies such as Stewart (1991), Krivogorsky (2006), Drobetz and al (2003). Other indicators used to measure the value creation are the TSR (Total Shareholder Return) who expresses itself in percentage and calculates as following: final stock market price - stock market price of departure + dividends paid over the period divided by stock market price of departure, Maaloul (2008), Shome and Singh (1995). The advantage of this measure that it reflects much more value creation progress in the future through the consideration of share price which reflects this progress.

### *Explanatory variables*

#### *• Variables related to the company*

*- Independence, size, number of meetings, specialist committees and the Board of Directors.*

On the basis of the empirical works which we presented in the review of the literary, we chose to measure the various variables bound to the board and its composition through the indicators which appear as following: INDECON, the percentage of independent directors in the board,

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Lifschutz (2010). TAILCON, the total number of the directors, Godard (2002). REUNCON, the total number of Board meetings a year, Abbott and al. (2003).

Concerning specialists committees we chose two committees, that of audit and other one of the remuneration. Our choice of measure joined the majority of the studies and our variable appears as follows: TAILCA, the total number of the directors in the audit committee, Monroe (2011). INDECA, the number of the independent directors in the audit committee, Krishnan and Visvanathan (2009). REUNCA, the total number of meetings of the audit committee a year, Crushes, (2009). TAILCR, the total number of the directors in the committee of remuneration, Main and Johnston (1993). INDECR, the number of the independent directors in the committee of remuneration, Bizjak (2003). REUNCR, the total number of meetings per year of the remuneration committee, Goodwin-Stewart and Kent (2006).

### *- The composition of the company's stockholders' structure*

We measure the impact of this mechanism determine of the responsibility of manager through three main blocks held shares in a company to know the shareholding governmental, institutional and employee. According to Dionne and Triki (2004), the existence of the institutional shareholders having more of 5 % the capital decreases the costs of asymmetry of information and obliges the manager to choose a strategy risked to improve the value of the company. Even results were confirmed by Wright and al (1996). Thus the percentage of the actions detained by these three types of shareholding can play an important role to improve the wealth of the company. ACTGOV, the percentage of the actions detained by the government, Porta and al (1999). ACTINVINS, the percentage of the actions detained by institutional investors, Gul and al (2007). ACTSAL, the percentage of the actions detained by the employees, Faleye and al (2006).

### *- Risk management*

To study the impact of the efficiency of the management system of the risks on the performance and the wealth of the company, we use three variables to know the presence of a management committee of the risks in the company (COMRISK, a binary variable which is equal to 1 if the company has a committee for the risk management, 0 otherwise), the debts of the company (DETENT, measured by the total debt ratio which equal to total debt / Asset total; André and al. (2010), Gist (on 1992)) and the environmental and social publication of a report (RAPSO, the existence or not of a social or environmental report).

### *- Corporate ethics*

A set of the strong ethical conditions can lead to a general tendency for the managers to act in the interests of their companies, Booth (2004), Rutledge and Karim (1999). We measure these conditions by the presence of an Ethics Committee and the existence of a code of ethics within the company. COMETHIQ, a binary variable which is equal to 1 if the company has an Ethics Committee, 0 otherwise. CODETHIQ, a binary variable which is equal to 1 if the company developed a code of ethics and 0 otherwise.

### *• Variables regarding management characteristics*

### *- The network, remuneration policy, education background, experience and age*

In this study, we are going to handle several characteristics of the function and the profile of manager. Nguyen-Dang (2005), shows that the membership in a social relationship (for example stemming from a certain training, occupied by the external activities to the company) did not prevent a manager from having a bad performance while Bertrand (2003) asserts a positive role played by the experience of the managers on the performance of companies. Furthermore, the system of remuneration in the company has to encourage the manager to make decisions allow realizing a wealth for the shareholders, Finkelstein and Boyd (1998). According to these studies, we definitions our variables as the following one: LIENREL: number of the mandates exercised by the manager. REMUNG: the sum of the fixed remuneration and of incentive short-term is attributed in the long term to the manager. FORMDIR: a binary variable which equal to 1 if the manager has a high school diploma, 2 if the manager arranges a university degree, 3 if the manager arranges a diploma of a great school. AGED: the age of manager at the beginning of period of study. EXPERD: equal among years of presence of the manager has the direction of the company at the beginning of the period of study.

#### *The variables of control*

We use in our study the variables of control susceptible to have an impact on the performance and the value creation in the company.

##### *- The size and the complexity of the company*

In the literary the influence of size and complexity of the company on the performance and the value creation is contradictory. In (2007), Poulain-Rehm asserts that there is no significant relation between these variables while Cheffoul (2009) shows that the size of the company, impact negatively the performance. However, Crepon and al. (1998) Show a positive and significant influence between both variables. TALENT: the logarithm of the total of the assets of the company. COMPLENT: it is about the number of the subsidiaries of the company.

##### *- The business sector*

We integrated companies belonging to the financial business sector to study the difference in the results of applications in three countries of our study. SECTAC: a variable which takes the value 1 if the company belongs to the financial sector, 0 otherwise.

## **Empirical results and discussion**

### *Impact of the determinant factors concerning management responsibilities on the performance and the value creation: comparative country analysis.*

First of all, we present through graphs 1 and 2 the evolution of the performance and the value creation in the companies of our sample of 2005 until 2012. We notice a low performance and a value creation in three countries at the beginning of 2008 till the end of 2010, what maybe been understandable by the grave world financial crisis hangs this period when the managers have to commit more responsibility. The descriptive statistics shows that the average of profitability of the assets of companies for all the period of our study was 4.78 in France; 5.82 in Germany and 8.4 in United Kingdom. On the other hand the rate of profitability of the

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shareholder was on average 0.077 in the French companies; 0.23 in the German companies and 0.15 in the British companies.

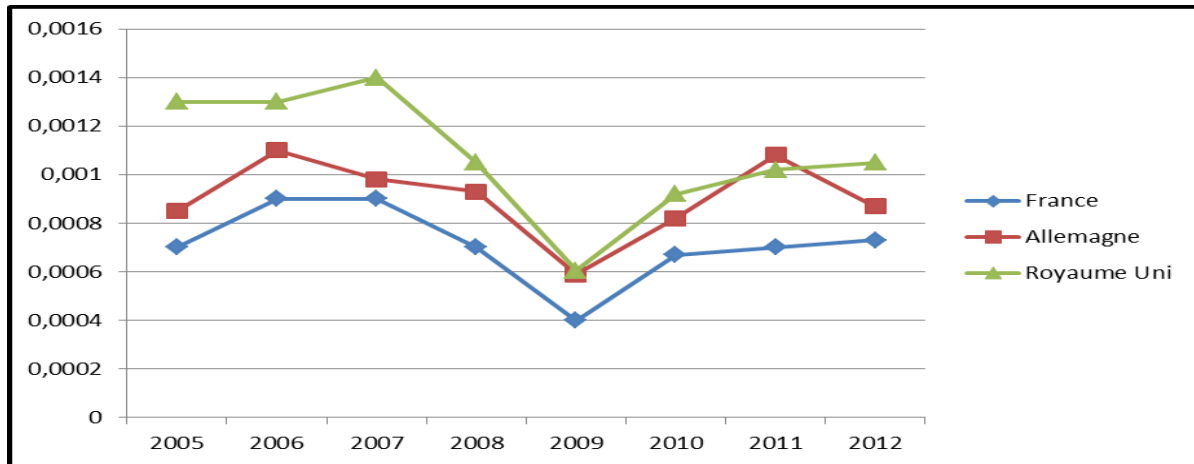


Figure 1 : Evolution of the company's performance by year and by country, ( 2005 – 2012 ).

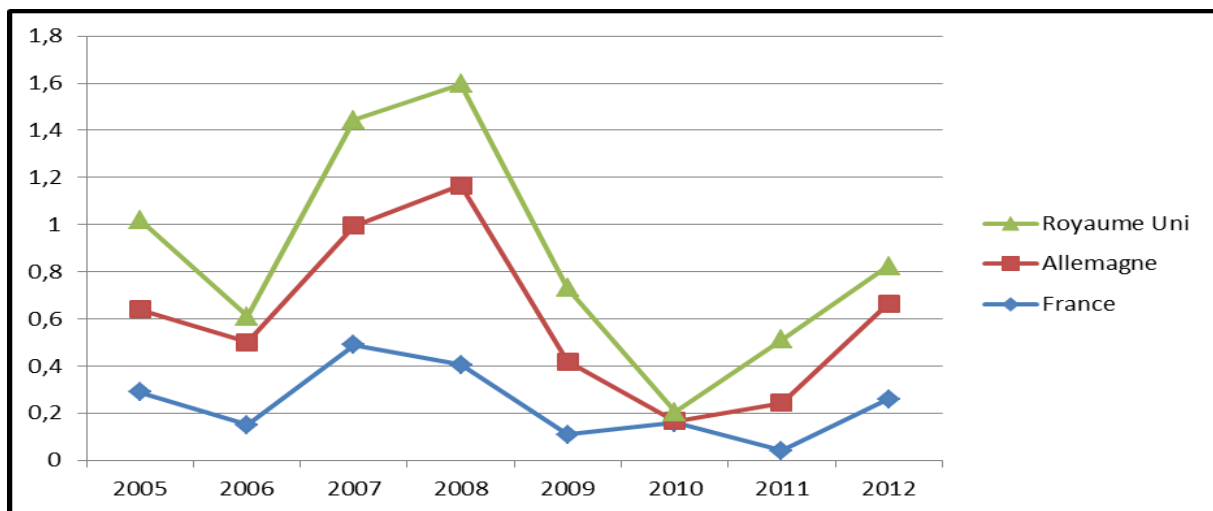


Figure 2 : Evolution of the company's value creation by year and by country ( 2005 – 2012 ).

Concerning the determining mechanisms bound to the company, the results of the regressions show that companies are averagely efficient regarding the characteristics and the compositions of its boards over all the period of our study. Tables 1, 2 and 3 summarize these results on the data of three countries of our sample.

Table 1: Impact of the determinant factors concerning the board's responsibilities and the specialized committees on the performance and the value creation : French companies

( $Y_i = \beta_0 + \beta_1 X_1 + \epsilon_i$ ),  $X_1$ : represents the variables related to the function of the Board

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>INDECON</b>	0.05	4.06***	0.12	2.066***	4.7 e-6	2.8***	0.006	0.708**	0.0007	0.92**
<b>TAILCON</b>	-0.007	-0.1	0.15	0.49	-4.7 e-6	-0.5*	-0.06	-1.265**	-0.004	-1.02**
<b>REUNCON</b>	-0.16	-2.02***	0.03	0.1	5.1 e-6	-0.5*	-0.03	-0.59**	-0.013	-2.76***
<b>NOMBREC</b>	0.26	0.98**	1.18	1.02**	1.1 e-4	3.4	0.57	3.208***	-0.016	-0.1
<b>TAILCA</b>	-0.05	-0.28	-0.35	-0.41	-3 e-5	1.2**	0.01	0.147**	0.009	0.7**
<b>INDECA</b>	0.02	1.77**	0.06	1.31**	-3 e-7	-0.2	0.01	2.23***	0.00004	0.1
<b>REUNCA</b>	-0.09	-0.789**	0.16	0.32	-1.8 e-5	-1.2**	-0.08	-0.99**	-0.001	-0.15
<b>TAILCR</b>	0.12	0.653**	0.36	0.42	2.8 e-6	0.12	0.17	1.33**	0.009	0.78**
<b>INDECR</b>	0.004	0.431	0.01	0.43	1.3 e-6	1.06**	0.003	0.6**	0.0002	0.38
<b>REUNCR</b>	-0.11	-0.98**	-0.58	-1.12**	-2 e-6	-0.14	-0.03	-0.33	-0.011	-1.55 **
<b>TAILENT</b>	-0.51	-1.64**	1.39	1.03**	3 e-4	-8.06***	-1.08	-5.15***	-0.008	-0.41
<b>COMPLENT</b>	0	-0.193	0.03	2.65***	-3 e-7	-0.9**	-0.0006	-0.32	0.0002	1.52 **
<b>SECTAC</b>	0.51	-0.624**	2.32	0.64**	6 e-5	0.65**	-0.14	-0.26	0.023	0.45
<b>R<sup>2</sup></b>	0.69		0.58		0.86		0.64		0.48	
<b>DF</b>	651		651		651		651		651	

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	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>F-stat</b>	3.566		1.484		9.9		4.66		1.17	
<b>p-value</b>	1.86 e-5		0.1173		<2.2 e-16		8.96 e-8		0.3	
<b>M.E.</b>	1.57 e-16		1.488 e-15		-2.54 e-20		-6.35 e-17		-2.53 e-17	
<b>S.D.E</b>	5.89		25		0.0007		3.96		0.36	

**Legend :** M.E. : Average error model, S.D.E. : Standard deviation error, D.F. : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

Table 2 : Impact of the determinant factors concerning the board's responsibilities and the specialized committees on the performance and the value creation: German companies

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>INDECON</b>	0.04	0.933**	0.003	0.077	0.004	0.123	0.014	0.376	0.07	1.74**
<b>TAILCON</b>	-0.02	-0.426	-0.05	-0.933**	-0.07	-1.419**	0.011	0.206	- 0.068	- 1.17**
<b>REUNCON</b>	-0.01	-0.28	0.02	-0.51*	-0.09	-2.669 ***	-0.03	-0.855**	- 0.037	- 0.88**
<b>NOMBREC</b>	0.08	1.34**	0.005	0.079	0.04	0.834**	0.06	1.035**	0.018	0.3
<b>TAILCA</b>	0.127	2.06***	0.05	0.844**	0.05	1.02**	0.08	1.306**	-0.013	-0.2
<b>INDECA</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>REUNCA</b>	-0.12	-2.07***	-0.1	-1.762**	-0.07	-1.414**	-0.04	- 0.71**	-0.032	-0.55 **
<b>TAILCR</b>	0.15	2.45***	0.14	2.304 ***	0.7	12.462***	0.04	0.646**	0.046	0.73 **
<b>INDECR</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>REUNCR</b>	-0.11	-1.76**	-0.08	-1.259**	-0.82	- 15.379***	-0.017	-0.279	-0.053	-0.83**
<b>TAILENT</b>	-0.2	-5.06***	0.03	0.605**	-0.09	-2.694***	-0.18	-4.486***	-0.16	-3.83***
<b>COMPLENT</b>	0.014	0.36	0.04	1.095**	0.07	2.159***	0.034	0.873**	0.027	0.56**
<b>SECTAC</b>	-0.005	-0.14	0.0006	0.015	0.004	0.126	-0.028	-0.581**	0.035	0.87**
<b>R<sup>2</sup></b>	0.57		0.34		0.84		0.47		0.32	
<b>DF</b>	636		636		636		636		636	
<b>F-stat</b>	4.415		1.389		27.74		3		1.838	
<b>p-value</b>	1.8 e-6		0.1733		<2.2 e-16		0.00066		0.04	
<b>M.E.</b>	1.27 e-17		-2.34 e-17		1.24 e-18		-4.24 e-18		-1.75 e-17	
<b>S.D.E</b>	0.963		0.988		0.822		0.975		0.984	

**Legend :** **M.E.** : Average error model, **S.D.E.** : Standard deviation error, **D.F.** : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

Table 3 : Impact of the determinant factors concerning the board's responsibilities and the specialized committees on the performance and the value creation: UK Companies

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>INDECON</b>	0.0996	2.66***	0.05	1.233**	0.07	1.728**	0.023	0.586**	0.03	0.731**
<b>TAILCON</b>	-0.129	-0.308	0.013	0.288	-0.04	-0.978**	-0.08	-1.762**	0.003	0.068

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	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
REUNCON	-0.1	-2.679***	-0.031	-0.761**	0.016	0.399	-0.01	-0.231	-0.008	-0.196
NOMBREC	0.0514	1.407**	0.05	1.481**	0.17	4.334***	-0.004	0.111	0.03	0.755**
TAILCA	-0.0846	-1.903**	-0.0987	-2.042***	0.015	0.315	-0.009	-0.186	2 e-5	0
INDECA	0.0129	0.335	0.01	0.238	0.09	2.207***	0.005	0.132	0.04	0.949**
REUNCA	0.117	2.796***	0.0528	1.164**	0.077	1.715**	0.004	0.088	0.009	0.217
TAILCR	0.0246	0.571**	0.054	1.17**	0.073	1.597**	-0.07	-1.552**	-0.017	-0.362
INDECR	0.0409	1.04**	0.02	0.47	0.009	0.224	0.02	0.574**	0.07	1.552**
REUNCR	-0.108	-2.704***	-0.051	-1.186**	-0.03	-0.077	0.016	0.363	0.012	0.274
TAILENT	-0.0394	-9.83***	-0.112	-2.584***	-0.06	-1.523**	-0.072	-1.652**	-0.17	-3.969***
COMPLENT	-0.0174	-0.498	-0.005	-0.141	0.001	0.264	-0.007	-0.198	0.019	0.51*
SECTAC	0.0041	0.117	-0.045	-1.181***	-0.006	-0.162	-0.001	-0.364	-0.02	-0.566**
R <sup>2</sup>	0.79		0.48		0.43		0.24		0.35	
DF	698		698		698		698		698	
F-stat	11.31		1.325		3.003		0.8543		1.968	
p-value	2.2 <sup>e</sup> -6		0.1926		2.6 e-4		0.602		0.0209	
M.E.	-4.14.e-17		-3.78 e-17		1 <sup>e</sup> 10-16		-2.52 e-17		6.14 e-17	
S.D.E	0.9		0.987		0.982		0.992		0.982	

**Legend :** M.E. : Average error model, S.D.E. : Standard deviation error, D.F. : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

Tables 1 and 2 show that in terms of link of causality between compositions of board of directors and performance, France and Germany are practically similar. Our explanatory variables the independence, the meetings, the total number of the committees of the board influences positively the profitability and the wealth of the company. So a relation is positive between the size and the independence of the committees of audit and remuneration and the performance of the company, thus our results confirm our hypotheses for three countries concerning these variables. On the other hand, we found a negative impact of the size of board and the number of its meetings of a highly-rated and the performance and value creation within the company on the other side. The same negative impact was noticed for the number of the meetings of the committees of audit and remuneration. Results of obtained researches are similar in the numerous empirical studies in the academic literature such as Mishra and Nielsen (2000), Conger and al (1998), Kirkbride and Letza, (2005), Pearce and Zahra (1992). We can conclude that from it France occupies globally an intermediate place regarding the characteristics of the board of directors and the averages between three countries concerning the size of the board of directors or the surveillance are very close.

In the case of the United Kingdom, the table 3 shows the absence of significant relation between the size and the meetings of board on one hand and the profitability of the active of company of somewhere else, what reaffirms the result obtained by Schnake and William in 2008. On the other hand our result confirms the positive impact of the independence, the total number of the committees of board of directors or surveillance and the profitability and wealth of the German company. This result allows concluding that the smooth running of the board of directors represents a determining mechanism of the responsibility of manager, which improves the performance and the value creation in the company.

Tables 4, 5 and 6 summarize the results of the impact of the determining mechanisms of the responsibility bound to the structure of the shareholding, the risk management and the ethics of the company on the performance and the value creation for three countries.

Table 4 : Impact of the management characteristics (shareholder structure, risk management and ethics) on the performance and the value creation: French companies

( $Y_i = \beta_0 + \beta_1 X_2 + \varepsilon_i$ ),  $X_2$  : represents the variables related to the structure of ownership, risk management and company's ethics



	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>ACTGOV</b>	0.002	0.1	-0.02	-0.273	-3 e-6	-1.4**	-0.007	-0.57**	-0.0008	-0.69**
<b>ACTINVES</b>	0.04	2.5***	0.007	0.088	1 e-5	5.8***	0.002	0.19	0.0008	0.7**
<b>ACTSAL</b>	0.06	1.13**	0.07	0.303	3 e-6	0.5*	0.02	0.52**	0.004	1.22**
<b>COMRISK</b>	0.07	0.1	5.96	1.986**	2 e-4	2.3***	0.92	1.9**	0.03	0.66**
<b>DETEENT</b>	-1.42	-0.97**	1.5	0.242	-1 e-3	-8.9***	-0.35	-0.3	-0.05	-0.57**
<b>RAPSO</b>	-0.38	-0.7**	-2.98	-1.287**	-8 e-5	-1.3**	-0.22	-0.6**	0.01	0.34
<b>COMETHIQ</b>	0.82	1.2**	-0.47	-0.162	4 e-5	0.5*	-0.003	-0.007	0.02	0.57**
<b>CODETHIQ</b>	1.65	2.8***	2.5	0.993**	8 e-5	1.2	-0.016	-0.043	-0.005	-0.14
<b>TAILENT</b>	-1.14	-3.9***	-0.29	-0.234	-3 e-4	-8.5***	-1.14	-5.7***	-0.03	-1.47 **
<b>COMPLENT</b>	-0.0003	- 0.1	0.03	2.761***	-5 e-7	-1.7**	-0.0006	-0.3	0.0003	1.72**
<b>SECTAC</b>	-0.56	-0.6**	2.15	0.604**	4 e-6	0.04	-0.27	-0.47	0.01	0.21
<b>R<sup>2</sup></b>	0.52		0.46		0.72		0.58		0.34	
<b>DF</b>	740		740		740		740		740	
<b>F-stat</b>	4.2		1.62		22.79		3.83		0.73	
<b>p-value</b>	1.6 e-7		0.08		<2,2 e-16		1.04 e-5		0.714	
<b>M.E.</b>	8.2 e-17		1.5 e-15		8 e-20		2.4 e-18		-1.3 e-17	
<b>S.D.E</b>	5.8		25.4		0.0007		3.99		0.36	

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**Legend :** M.E. : Average error model, S.D.E. : Standard deviation error, D.F. : Degrees of freedom. significant \*\*\*  $p < 0.01$ ; Significant \*\*  $0.01 < p < 0.05$ ; \* Significant  $0.05 < p < 0.10$ .

**Table 5 : Impact of the management characteristics (shareholder structure, risk management and ethics) on the performance and the value creation: German companies**

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
ACTGOV	0.057	1.52**	0.04	1**	0.04	0.99**	0.07	1.8**	-0.003	-0.083
ACTINVES	-0.046	-1.23**	-0.063	-1.58**	-0.12	-3.2***	-0.03	-0.69**	0.03	0.87**
ACTSAL	0.017	0.47	0.017	0.43	-0.061	-1.58**	-0.03	-0.66**	-0.0027	-0.067
COMRISK	-0.016	-0.44	0.009	0.23	0.063	1.59**	0.07	1.83**	0.06	1.536**
DETEENT	-0.11	-2.91***	-0.13	-3.19***	-0.024	0.38	0.02	0.49	-0.08	-2.109***
RAPSO	-0.16	-3.83***	-0.06	-1.568**	-0.09	-2.068***	-0.03	-0.74**	-0.05	-1.074**
COMETHIQ	-0.016	-0.43	0.015	0.404	-0.05	-1.37**	0.01	0.346	-0.02	0.412
CODETHIQ	0.04	1**	+0.044	+1.014**	0.06	1.45**	-0.03	-0.799**	0.05	1.216**
TAILENT	-0.08	-1.955**	-0.11	-2.593***	-0.15	-3.37***	-0.12	-3.976***	-0.16	-3.75***
COMPLENT	0.0046	0.121	0.04	1.099**	0.05	1.24**	0.04	0.986**	0.014	0.35
SECTAC	0.005	0.149	0.007	0.168	-0.15	-0.39	-0.014	-0.379	0.034	0.873**
R <sup>2</sup>	0.75		0.33		0.45		0.42		0.31	
DF	635		635		635		635		635	
F-stat	8.972		2.899		3.8		3.533		2.087	
p-value	5.04 e-16		0.0006		8.5 e-6		4.26 e-5		0.016	

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>M.E.</b>	1.5 e-17		-2.32 e-17		-2.37 e-17		-3.65 e-17		6.07 e-17	
<b>S.D.E</b>	0.924		0.97		0.965		0.968		0.98	

**Legend :** **M.E.** : Average error model, **S.D.E.** : Standard deviation error, **D.F.** : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

Table 6 : Impact of the management characteristics (shareholder structure, risk management and ethics) on the performance and the value creation: UK Companies

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>ACTGOV</b>	0.03	0.76**	0.003	0.085	0.06	1.51**	-0.0001	-0.004	-0.01	-0.27
<b>ACTINVES</b>	-0.003	-0.07	0.02	0.523**	0.06	1.54**	0.007	0.179	0.02	0.554**
<b>ACTSAL</b>	-0.01	-0.31	0.008	0.231	-0.03	-0.84**	0.0024	0.069	0.03	0.9**
<b>COMRISK</b>	0.019	0.51*	-0.01	-0.331	0.1	2.93***	0.02	0.52**	0.026	0.68**
<b>DETEENT</b>	-0.03	-0.85**	-0.16	-4.182***	-0.04	-1.09**	-0.04	-1.084**	-0.1	-2.75***
<b>RAPSO</b>	-0.04	-1.07**	-0.03	-0.6**	-0.025	-0.63**	-0.05	-1.273**	0.012	0.32
<b>COMETHIQ</b>	0.03	0.91**	-0.004	0.1	-0.015	-0.39	0.006	0.169	0.015	0.41
<b>CODETHIQ</b>	0.04	1.06**	0.02	0.416	0.1	2.53***	0.016	0.391	0.04	1.15**
<b>TAILENT</b>	-0.35	-9.52***	-0.007	-1.754***	-0.08	-2.13***	-0.06	-1.483**	-0.18	-4.6***
<b>COMPLENT</b>	-0.0004	-0.012	0.001	0.034	0.033	0.63**	-0.04	-0.118	0.02	0.584**
<b>SECTAC</b>	0.009	0.25	-0.03	-0.904**	-0.025	-0.68**	-0.01	-0.337	-0.017	-0.46

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	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>R<sup>2</sup></b>	0.82		0.32		0.42		0.12		0.36	
<b>DF</b>	699		699		699		699		699	
<b>F-stat</b>	9.447		2.075		2.63		0.472		2.965	
<b>p-value</b>	<2.2 e-16		0.02		0.0019		0.9313		0.0004	
<b>M.E.</b>	2.76 e-17		-5.16 e-18		-1.9 e-17		-1.99 e-17		2.7 e-18	
<b>S.D.E</b>	0.927		0.982		0.987		0.996		0.978	

**Legend :** **M.E.** : Average error model, **S.D.E.** : Standard deviation error, **D.F.** : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

Concerning the composition of the shareholding, we studied the influence of the presence of government, institutional investors and employees on the performance and the value creation. Our results show that the impact of every type of these shareholders differs from a country in the other one. In the case of France, the presence of governmental shareholding impacts negatively on the profitability and on the value creation of the company, what confirms the idea developing by Davies and al. (2005), according to them the shareholders are obliged to align their interests with those of the managers not to involve their business with the company and consequently a negative impact of the existence of the shareholders altogether. On the other hand, a positive relation is raised for Germany and no significant impact in the case of the United Kingdom.

The result bound to institutional investors confirms our hypothesis in the case of the French and British companies where the presence of institutional investors influences positively the performance of company. These obtained results are similar in the empirical studies bring by Dionne and Triki (2004), Wright and al. (1996) where they confirm that the existence of the institutional shareholders having more of 5% the capital decreases the costs of asymmetry of information and obliges the manager to choose a strategy risked to improve the value of the company. Also, Kang and Shivdasani (1995) examine the relation between the presence of the financial institutions and the probability to replace little successful managers. They observe that companies associated with a main bank are more incited to replace the little successful managers and to recruit new managers.

For the case of the German companies, we found a negative relation between the existence of the institutional shareholders and the profitability of the German company. The same effect for Faccio and Lasfer (2000), they observe that the control exercised by the financial institutions does not improve generally the performance of the company. Concerning the presence of the employee shareholding and the performance of company, our result asserts the positive impact of this type of shareholder in case of France; it appears to play a leading part to solve conflicts of interests between the employees and the shareholders (especially the managers) and to strengthen the efficiency of control of the board of directors. On the contrary, no significant relation was presence in the cases of the British and German companies. The results of numerous studies concerning this relation remain contradictory.

Besides, our results demonstrate that the presence of a good functioning of system of management of risk and control set up by the company plays an important role to assure a better management of the company. We notice that the presence of a committee loaded with the management of the risks influences positively the level of the performance and the value creation for the case of three countries, France, Germany and the United Kingdom. Recently, we find in various countries this committee among specialists committees of board of directors. On the other hand, we found a negative relation between the organizational posting by the publication of the social / environmental reports and the financial performance of the company. This result is similar to the study of Freedman and Jaggi, (1988), but is contradicted that loosened by several works such as Simpson and Kohers (2002), Nelling and Webb (2009), Preston and O' Bannon (1997) that they show a positive link between both constituents. Finally, tables 4, 5 and 6 also assert our hypothesis 6b in three countries of our sample, the existence of a code of ethics constitutes a determining mechanism of the responsibility of manager which could improve the performance and the value creation in the company. While hypothesis 6a was validated in the case of France and no statistical relation found for Germany and the United Kingdom. What shows that a set of strong ethical conditions can lead to a general tendency for the managers, to act in the interests of their companies and represents a viable alternative of control of the behavior.

## ACCOUNTABILITY MECHANISMS OF MANAGERS AND ITS IMPACT ON PERFORMANCE AND VALUE CREATION: COMPARATIVE ANALYSIS (FRANCE, GERMANY AND THE UK)

The consideration the social, cultural, ethical and environmental aspects depend strongly in the capacity of the company and the managers to satisfy the needs of the various engaging parties. Even results presented by the work of Betsy Steven (2007) which confirm that if the codes are integrated into the organizational culture and communicated effectively, they can influence the behavior and guide the management decision-taking, for him the codes are effective instruments of shaping an ethical behavior and to guide the decision-taking.

*Impact of the managerial responsibilities and the managers' profile on the performance and the value creation: comparative country analysis.*

The figure 3 presents the evolution of manager's global remuneration for company during eight years of our period of study through three countries of our sample. We notice that there are differences between these countries in manager's remuneration. So an increase rose well during last years of our study. In this context the big size, the complexity and the structure of capital of companies form an important explanatory element of this level of the payments.

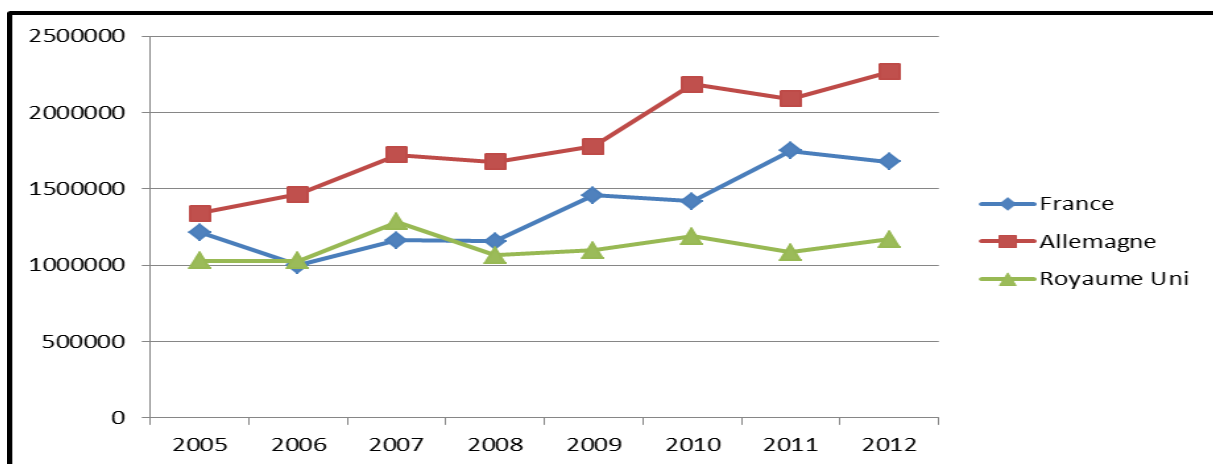


Figure 3 : Evolution of the total managers' compensation of by year and country, ( 2005 – 2012 ).

So, we can conclude that the differences at the level of global remuneration for manager have an impact on the level of the performance of the company. Tables 7, 8 and 9 summarize the statistical results of the impact of the determining mechanisms of the responsibility bound to the relational links, the level of training, the age and the experience of the manager on the performance and the value creation of three countries.

Table 7 : Impact of the managers profile e on the performance and the value creation: French companies  
( $Y_i = \beta_0 + \beta_1 X_3 + \varepsilon_i$ ),  $X_3$ : represents the variables related to the function and manager's profile

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>LIENREL</b>	-0.16	-0.7**	-0.64	-0.63**	-5.2 e-5	-1.8**	-0.22	-1.4**	-0.008	-0.54**
<b>REMUNG</b>	-9 e-6	-0.4	-7.7 e-7	-0.76**	6 <sup>e</sup> -12	0.2	-4.7 e-8	-0.29	6 e-9	0.4
<b>FORMDIR</b>	0.48	1.06**	1.31	0.64**	1 e-5	0.17	0.3	0.98**	0.03	1.04**
<b>AGED</b>	-0.07	-2.07***	-0.14	-0.95**	5 e-7	0.11	-0.05	-2.04***	-0.002	-1.04**
<b>EXPERD</b>	0.07	2.37***	0.22	1.6**	-5 e-6	1.3**	0.007	0.32	0.001	0.63**
<b>TAILENT</b>	-0.8	-2.86***	-1.2	-1**	-3.3 e-4	-9.5***	-1.04	-5.37***	-0.01	-0.78**
<b>COMPLENT</b>	-0.0066	-0.23	0.03	2.6***	-3.4 e-7	0.94**	-0.0006	-0.3	0.0003	1.67**
<b>SECTAC</b>	-0.61	-0.74**	2.5	0.7**	3.5 e-5	0.34	-0.3	-0.55**	0.008	0.16
<b>R<sup>2</sup></b>	0.53		0.41		0.85		0.74		0.22	
<b>DF</b>	738		738		738		738		738	
<b>F-stat</b>	2.589		1.649		12.05		5.5		0.9	
<b>p-value</b>	0.006		0.09		<2.2 e-16		2.4 e-7		0.51	
<b>M.E.</b>	1.7 e-17		-1.1 e-15		-3.2 e-20		-1.1 e-16		1.88 e-17	
<b>S.D.E.</b>	5.8		25.6		0.0007		4		0.36	

**Legend :** M.E.: Average error model, S.D.E. : Standard deviation error, D.F. : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

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Table 8 : Impact of the managers profile e on the performance and the value creation: German companies

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>LIENREL</b>	-0.03	-0.815**	-0.04	-0.965**	0.001	0.026	-0.05	-1.364**	-0.03	-0.8**
<b>REMUNG</b>	-0.11	-2.8***	-0.15	-3.732***	-0.03	-0.647**	-0.093	-2.335***	-0.025	-0.611**
<b>FORMDIR</b>	0.017	0.435	0.04	1.044**	0.036	0.909**	0.047	1.179**	0.065	1.59**
<b>AGED</b>	-0.078	-1.852**	-0.026	-0.611**	-0.077	-1.839**	-0.045	-1.083**	-0.032	-0.75**
<b>EXPERD</b>	0.1	2.486***	0.069	1.645**	-0.037	-0.917**	0.083	2.01***	0.013	0.321
<b>TAILENT</b>	-0.018	-4.406***	0.056	1.341**	-0.2	-4.903***	-0.167	-4.039***	-0.13	-3.11***
<b>COMPLENT</b>	0.022	0.573**	0.048	1.203**	0.04	1.183**	-0.025	-0.65**	0.02	0.51*
<b>SECTAC</b>	-0.001	-0.035	-0.003	-0.068	-0.01	-0.278	-0.019	-0.498	0.034	0.856**
<b>R<sup>2</sup></b>	0.53		0.37		0.62		0.61		0.28	
<b>DF</b>	638		638		638		638		638	
<b>F-stat</b>	5.622		2.638		6.318		4.848		2.059	
<b>p-value</b>	1.7 e-7		0.005		1.35 e-8		2.73 e-6		0.03	
<b>M.E.</b>	3.97 e-17		-7.8 e-18		2.2 e-17		1.65 e-17		-4.67 e-17	
<b>S.D.E.</b>	0.962		0.98		0.958		0.967		0.98	

**Legend :** M.E. : Average error model, S.D.E. : Standard deviation error, D.F. : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

**Table 9 : Impact of the managers profile e on the performance and the value creation: UK companies**

	Y1 (ROA)		Y2 (ROE)		Y3 (QTOBIN)		Y4 (MTBV)		Y5 (TSR)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
<b>LIENREL</b>	-0.08	-2.167***	-0.06	-1.437**	-0.08	-2.132***	-0.009	-0.22	-0.03	-0.789**
<b>REMUNG</b>	-0.022	-0.592**	-0.04	-0.916**	-0.09	-2.252***	-0.007	-0.186	-0.05	-1.248 **
<b>FORMDIR</b>	-0.026	-0.716**	-0.07	-1.904**	-0.01	-0.274	0.004	-0.104	-0.02	-0.66**
<b>AGED</b>	0.001	0.034	0.0165	0.42	-0.09	-2.373***	-0.05	-1.38**	-0.04	-0.94 **
<b>EXPERD</b>	0.015	0.412	0.03	0.827**	0.09	2.334***	0.02	0.59**	0.03	0.87**
<b>TAILENT</b>	-0.33	-9.19***	-0.07	-1.842**	-0.04	-0.962**	-0.05	-1.37**	-0.15	-3.96***
<b>COMPLENT</b>	0.0001	0.004	0.005	0.138	0.02	0.6**	-0.009	- 0.235	0.02	0.521*
<b>SECTAC</b>	0.013	0.376	-0.034	-0.904 **	-0.01	-0.319	-0.01	-0.326	-0.007	-0.178
<b>R<sup>2</sup></b>	0.86		0.34		0.42		0.12		0.38	
<b>DF</b>	702		702		702		702		702	
<b>F-stat</b>	12.19		1.45		2.87		0.6467		3.167	
<b>p-value</b>	<2.2 e-16		0.1629		0.0024		0.7573		0.0009	
<b>M.E.</b>	2.9 e-17		1.45 e-17		-4.6 e-17		2.3 e-17		-7.7 e-17	
<b>S.D.E.</b>	0.929		0.99		0.982		0.99		0.98	

**Legend :** M.E. : Average error model, S.D.E. : Standard deviation error, D.F. : Degrees of freedom. significant \*\*\* p <0.01; Significant \*\* 0.01 <p <0.05; \* Significant 0.05 <p <0.10.

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The results of our research show that the remuneration for the managers is negatively linked to the performance German and British companies and no significant result for the French companies. This contradiction in the results already exists in the literature. In 2004, Eliezer and Shivdasani show that the stock-option impact positively the value of the company and its performance. Of the same Hall and Liebman (1998) confirms this idea. On the other hand, other part of research shows a low statistical relation between both variables. In France, Albouy (2004) confirms that there is no link between the remuneration for the managers and the profitability of companies listed on the stock exchange in Paris. Accordingly, Pige (1994) found that the relation between performance and remuneration is low and is not significant. The studies show that the very high compensation policy of managers does not certainly lead the managers to be more responsible and successful.

Besides, our results highlight the existence of a negative and significant relation between the relational links of managers and the general profitability of the company in the case of three countries of our sample. In this context, we join most of the empirical studies which confirm this argument. According to Kramarz and Thesmar (2006), companies guided by the managers benefiting from relational links were less successful on average. A manager has more tendencies to imitate the behavior of another manager in case he maintains with him a contact which allows to observe and to interpret his behavior and how he react concerning his responsibilities closed view the others. Thus these relational links of the managers may increase his irresponsible behavior. Of same Nguyen-Dang (2005) observe that the membership in a social relationship did not prevent a manager from having a bad performance.

On the other hand, the variables stemming from the profile of manager better seem to explain the performance of the company. Our results demonstrate that the hypothesis of the age and the experience of the manager validated well in all the countries. The experience of manager has a positive impact on the consideration of the responsibility. What could improve the performance and the value creation in the company; On the other hand we found that the age of the manager favors an irresponsible behavior of manager, what is translated by a low performance and a wealth of the company. The closeness of manager at the age of retreat leads him to escape from its commitments and its responsibilities towards the various expectations of stakeholders within the company.

Concerning the level hypothesis of education of the manager, it is confirmed in France and in Germany. Even results presented by the study of Bertrand and Schoar (2003) that show a positive role played by the education of the managers on the performance of companies. Thanks to the scientific and professional capacity of manager, he can direct and manage the various activities of his company in the right direction. On the other hand, this hypothesis is rejected in the United Kingdom. The relation between the education of the manager and the performance was negative in this country.

By contribution in the variables of the controls of our study, our results show that the size and the complexity of the company are important determinants of the responsibility of manager in the company. These results are in accordance with our expectations and validate those cleared in the previous researches such as Crepon and al. (1998) which show a positive and significant influence between both variables. On the other hand we did not find a precise and significant relation enter it belonging companies to the financial business sector and their performance and the value creation. In this context, the results are always contradictory.

## Research Contributions and Limitations

This study can have several academic contributions and practical implications at the same time for various reasons. From an academic point of view, our study was interested to handle with an essential dimension of the management and of governance of company, worth knowing the responsibility of the manager and his various mechanisms in the company. This obtained responsibility has a big importance in front of the scene of these crises and the different pressures (especially societal) which companies face, their duties and the roles of their managers.

Unlike the previous research works, our research constitutes an empirical and comparative analysis between three influential countries of Europe naturally France, Germany and the United Kingdom. We chose these first three European economic powers with their stock indexes the most important to know SBF 120, FTSE 100 and HDAX 110. Furthermore, the period of our study, it was from year 2005 to year 2012 for three countries. We chose this period as several reasons: first of all it is the long period of eight years that allows a good evaluation of our studied event, follows this period in known several events by it especially the various monetary and financial world crises. It is about the world financial crisis in 2007-2008 (subprime mortgage crisis) and the world economic crisis of the end of 2009 and the beginning of 2010 in Greece. Finally we constituted a final sample composed of 284 French, British and German companies quoted in stock exchanges with 2272 relate annual examined during our period of study.

This study also has practical implications, because it allows a better understanding of the determination of the various mechanisms of the responsibility of the company directors (Accountability), as well as an explanation of the link of causality between these mechanisms and the performance and the value creation in the sense of the European company. It can supply useful information for the professionals such as company directors and even for financial institutions at the time of taking decisions and the more effective strategic choices. However, our study also presents certain limits, which can constitute important tracks of research for later works. The most important are bound to the size of the sample that we represented the European context by three countries which, certainly constitute of major powers of Europe, but the determinants of the responsibility of which represent differences compared with other countries. So, within the framework of future works, it would be interesting to enlarge the sample by integrating other countries, what would allow having a more developed vision of the European context.

## Conclusion

Following the high profile financial scandals of 2002-2003, corporate management has been faced with strong pressures resulting from more regulatory requirements, as well as the increasing expectations of various groups of stakeholders. The regulations urge management to implement more effective accountability mechanisms as well as good ethical conduct. The results of this study provide evidence that the good functioning of the board of directors and the specialized committees are determinant factors in management accountability mechanisms which will in turn have positive effect on the company's performance and the value creation.

With regard to the relationship between the managerial characteristics (management networks, compensation package, experience, and age) and the financial performance, our results highlight the existence of a negative relation between the management networks, age, high remuneration (positive in the case of experience) and the company's performance. This study should have academic and practical contributions particularly for regulators seeking to

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improve the companies' practices and organizational functioning within capital market economy.

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## FINANCIAL REPORTING OF DONATIONS-COLLECTING NPOS IN AUSTRIA – EMPIRICAL EVIDENCE

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**Abstract:** *Accountability is gaining in importance for donations-collecting non-profit organisations (NPOs) due to increasingly scarce financial resources and ever more NPOs vying for them. Although the Austrian Donation Seal of Quality provides an encompassing institutional framework for financial reporting, its provisions are not adhered to by many donations-collecting NPOs in Austria. The total volume of the donations obtained is being identified as main driver for a good development status of financial reporting, whereas the relative importance of donations as a financing source doesn't seem to play a role with regard to its relative importance. The field of activity the NPO was working in also proves to be of no significance.*

**keywords:** *donations, empirical study, financial reporting, nonprofit organisation, Austria*

### Introduction

Already the classification of an organisation as nonprofit organisation often happens with regard to the distinctive feature that financial resources from donations are available, which is typically not the case for profit-orientated enterprises (cf. already the definition of Salamon/Anheier, 1992). This implies that questions regarding the winning and securing of financial resources are of specific significance for these organisations. Furthermore, those organisations have to fulfil a role that is of relevance to society as a whole (discussed amongst others under the keyword “civil society”): NPOs ensure the fulfilment of certain demands (via the services offered), facilitate self-help or represent interests of their members or third parties politically (advocacy). This spectrum of tasks can be financed with the resources allocated, whereas in many cases, it could not be accomplished without these donations. The attention paid to this topic in the context von NPO financing is therefore accordingly high (and multi-layered).

The danger involved in this is that NPOs could be reduced just to this aspect of their acting – which would not reflect today's reality and the developments in the NPOs appropriately: Schneider/Haider, 2009, estimate for Austria that the percentage of donations with regard to the total revenues of the NPO-sector amounts to only 8,49 %. In contrast, subsidies from public authorities as well as compensations from private and public sources for services rendered play a much bigger role for financing nowadays. The trend towards the much discussed “economisation” of the sector (e. g. Dart, 2004) leads to a rising importance of transactional

performance relationships and thus corresponding forms of financing. Only in single areas of activities (such as culture, development aid etc.) donations traditionally play a bigger role as in most of the others (e. g. health or social services) (cf. Neumayr/Schober/Schneider, 2013: p. 471). Donations are expected to gain significance in the future as well – due to demographic as well as socio-cultural developments and, not least, in order to fill gaps which open up because of a (further) retreat of public financial backers from financing societally relevant services. Current findings show at most a stagnating share of revenues from donations in the finance mix of NPOs in the recent past (e. g. Dross/Priller, 2013: p. 370; Horak et al., 2013: p. 358).

Nevertheless, the topic “donations” seems to be a sometimes overrated one in the context of NPOs with regard to the (high) attention it attracts on the one hand and its practical relevance (which has to be viewed in a differentiated way) on the other hand. From a financial reporting point of view, specific conceptual issues are linked with this theme, such as the point in time when revenues have to be realised which makes it worthwhile to deal with this issue; furthermore it has significance as a driver of current discussions and reforms of financial reporting in NPOs. Although NPOs are confronted with a regulatory frame in German-speaking countries which shows large deficits, especially when the NPOs are unfolding comprehensive economic activities as well, these can be healed up to a certain extent by the reporting requirements put forward in the course of a donation seal of approval. Last but not least, a general societal interest is tied in with this kind of reporting (cf. e. g. Lee, 2004).

For the NPOs themselves, this reporting sometimes holds the possibility to use their financial reports quasi as marketing instrument to gain new (donation) funds. E. g., according to the empirical study of Ruhaya/Saunah/Yap, 2013, statistical tests of relationship indicate that the total volume of donations received is significantly related to the extent of disclosure. In a study with an experimental design, it was found that existing donors “*are more likely to respond to a fundraising appeal if it includes positive [summarised] financial accounting information*” (Parsons, 2007: p. 190). Notable in that context, the empirical study of Baba/Ishida, 2012, shows that Japanese donors subjectively consider revenue from charitable giving to be important and valuable financial information, indicating that donating could be a self-reinforcing action when properly disclosed. The developments in the environment of donations-collecting NPOs discussed above further increase the competition in the market for donations, as ever more organisations (have to) vie for donations, but the volume of donations does not increase accordingly. Thereby, the financial reporting of these organisations gets a competition-relevant aspect and increasingly gains in significance.

## **Overview regarding the professional literature and the norms**

### *The relevance of financial accounting information for donors*

(Especially empirically based) Literature regarding this topic is extensively available particularly in the Anglo-Saxon countries; therefore, this theme is much better researched than financial accounting issues in terms of other groups of resource providers. This might be especially grounded in the traditionally higher relevance of donations for the financing of NPOs in these countries (cf. e. g. Chang/Tuckman, 2010: p. 6 f.). Up to which extent it is possible and reasonable, to transfer those findings to German-speaking countries admittedly seems to be open to discussion against the background of different (legal as well as cultural) frame conditions.

Due to the lack of more specific professional literature of their own, researchers in German-speaking countries finally have to end up with this English literature out of necessity for now (cf. Baumüller/Haring, 2014).

To begin with, the basic need for financial accounting information for donators can be justified in a normative way for all types of resource providers: Organisations which have or want to work with other peoples' money are to be held accountable for them. But whereas major resource providers such as public funding bodies or institutional donors have at least the possibility to tie accountability duties to their granting of funds, average small donors do not have the same opportunities open to them. In this vein, Connolly/Hyndman, 2013, showed by means of semi-structured interviews with a range of donors that the questionable relevance of the information commonly disclosed in formal charity communications is viewed as a significant issue in terms of small dependent donors, although less critical in the case of non-dependent large donors who have the power to demand individualised information. Therefore, publicly available reports of good quality seem to be of significant importance for them, as a special worthiness of protection is given (cf. e. g. Stötzer, 2012: pp. 216 ff.). This is being reinforced by a general development towards a heightened demand for transparency and accountability, with which NPOs have to deal with – also relating to financial accounting (cf. Greiling, 2013). Finally, financial accounting offers the possibility, to address the principal-agency-problem which is especially relevant for NPOs, thereby being assigned a central role in corporate governance (cf. e. g. Jegers, 2011: p. 106 ff.; Stötzer, 2009: p. 145). This a fortiori, as NPOs often work as intermediaries between the donators on the one hand and the recipients of services on the other hand and therefore have to rely on trust, even more, if there is no direct link between donors and eventual beneficiaries (cf. Gordon/Khumawala, 1999: p. 39).

The relevance of such financial accounting information has been demonstrated for the market for donations in the USA (e. g. Gordon/Khumawala, 1999) and is taken as given nowadays. Trussel/Parsons, 2007, have identified four groups of influencing factors with regard to donations in the course of a meta-study they have conducted which are of special interest here, as they are derivations from financial reports:

- efficiency of the use of resources (esp. the amount of overheads)
- financial stability of the organisation
- volume of financial accounting information made available
- reputation of the organisation (usually measured via the size of the organisation, expressed by the sum of the balance sheet or total revenues)

The problem with these influencing factors is that quite often the focus lies on efficiency, narrowly interpreted in the sense of low overhead costs. On the one hand, this ignores the complexity of influential factors which determine their level (cf. e. g. Gmür, 2012), and can thereby induce wrong incentives for the NPOs on the other hand, such as neglecting certain overhead-prone services and innovations (cf. e. g. Tinkelman, 2009). The question how much overhead is reasonable and necessary (respectively: what can actually be understood under this term at all?) is indeed hard to answer; that's why it sometimes fades into the background. Having to report high overhead costs seems to belong to the main concerns of NPOs – and thereby to the fundamental obstacles for financial reporting in these organisations. This is being reinforced by the fact that finally, the costs of financial accounting have in turn to be attributed to these overheads; therefore – as the case may be – financial accounting binds re-

sources which might be needed more urgently for other purposes. At stakeholder-level, this elevated overhead might also cause a negative image of the organisation.

But the meta-study mentioned above also shows that there is a value associated with the extent up to which the financial accounting information is made available. Information out of financial reports can play a central role not only with regard to the acquisition of donations, but also for the successful retention of donors (cf. Naskrent/Siebelt, 2010). This might also be the case because it has been shown that the absence of fully developed and effective internal control procedures in the majority of non-profit organisations is a consequence of the limited role attached to accounting procedures (cf. Jegers, 2011: p. 105) and furthermore internal and external control were found to be complements rather than substitutes (e. g. in the sample of Vermeer/Raghunandan/Forgione, 2009: p. 297 f.). Consequently, sound accounting and reporting practices can be reasonable drivers of governance mechanisms within NPOs as a whole.

For winning and binding donors, it is likewise demanded to have a performance report, which goes beyond financial information by complementing them and focusing on the impacts accomplished (cf. Naskrent, 2012; Stötzer, 2009). As the Financial Accounting Standards Board (FASB) already stated in 1980: *“The information provided by financial reporting is primarily financial in nature: It is generally quantified and expressed in units of money. However, quantified information expressed in terms other than units of money and non-quantified information may be needed to understand the significance of information expressed in units of money or to help in assessing the performance of a non-business organization”* (FASB, 2008: p. 4). As a matter of fact, Hyndman, 1999, found that financial information was not considered to be that important by donors when compared to reporting on operational activities. A comparable conclusion was reached by Buchheit/Parsons, 2006, in their laboratory experiment: But although the operational information did lead to a higher proclivity to donate, this did not result in significantly more donations (ibid.: p. 679). McDowell/Li/Smith, 2013, showed in their internet-based experiment that individual donors are more likely to acquire nonfinancial information, such as non-profit organisations’ missions, goals, programmes, and outcomes than financial information. Donors integrate nonfinancial information into their decisions as their actual donations are significantly correlated with such information. Using a modified dictator game in an experiment, Li/McDowell, 2011, found that donors’ affective reactions can overshadow the effect of financial efficiency on individual donations. The conceptual frame for performance reporting is nevertheless largely still missing, so that this constitutes one of the central development areas in the future (cf. Greiling, 2013; Horak/Baumüller, 2013).

It is of relevance to note that although all donors did not particularly engage with the formal communications (e. g. via financial reports) in the study of Connolly/Hyndman, 2013, these types of formal communication are viewed by them as having significance and their production and publication serves as an important legitimising tool in the sector (enhancing trust and reputation). In a similar vein, Li/McDowell/Hu, 2012, found that a NPO’s financial efficiency indirectly influences individual donations through its effect on donors’ confidence. Another interesting aspect to note in that respect is that a lack of accounting knowledge can make NPOs being less inclined than comparable profit organisations to implement a proper accounting system due to higher implementation costs (cf. Jegers, 2011: p. 111; Froelich et al., 2000, provide an indication that accounting knowledge considerations are relevant in NPOs).

Finally, it always has to be remembered that the relevance of financial accounting information for donors is context-dependent: The findings of McDowell/Foragarty, 2006, indicate that reciprocity increases donor giving and, contrary to expectations, reciprocity also increases the demand for information.

*Frame conditions of financial accounting and reporting for donations-collecting NPOs in German-speaking countries (esp. in Austria)*

Whereas comprehensive disclosure requirements, databases and even rating agencies which address the (financial) reports of donations-collecting organisations and thereby contribute to their transparency to a significant extent exist in the Anglo-Saxon part of the world, a transparency deficit concerning this matter can be discovered in the German-speaking area. As this is also largely due to the legal frame requirements which can be dubbed to be underdeveloped, they are at the centre of the current accountability-debate (cf. thereto and for the following Baumüller/Haring, 2014; Greiling, 2013; Horak/Baumüller, 2013).

In the German-speaking countries, the relevant **legal requirements** governing **financial accounting and reporting** of NPOs are guided by the legal form, the organisational size and, where appropriate, the field of activity of these organisations. After the recent reform of the Swiss Code of Obligations, this applies to a lesser extent to Switzerland than to Austria and Germany. It is common to all three countries that especially the financial accounting and reporting rules for the legal forms which are characteristic for NPOs (associations and foundations, partly corporations according to public or ecclesiastical law) are heterogeneous and in general only little developed (e. g. referring to the general, rudimentary provisions of the code of civil law in Germany). Advanced instructions can be found in professional recommendations. A compulsory disclosure of the financial accounting information is not prescribed in general. However, it is worth noting that NPOs are partly treated quite differently in Austria with regard to the criteria mentioned above (as well as in Germany): Whereas the provisions of the Austrian Company Code create a largely comparable legal frame for profit-orientated enterprises, certain types of NPOs, such as universities (but not universities of applied sciences), have to fulfil almost excessive requirements with regard to financial reporting (also concerning the disclosure of this information). Thereby, it seems to be questionable, whether the interests of the stakeholder groups e. g. of universities are really requiring so much more protection than it is the case for those of big donations-collecting associations. This underlines the lack of concepts regarding the current frame conditions for NPOs which seems to be a consequence of not considering enough the specifics associated with these organisations.

At least in the context of donation-collecting organisations, these deficits can be partly mended by the cornucopia of **donation seals of approval** and the regulations concerning the financial reporting of these organisations which are contained in there; in the German-speaking literature, the provisions of the Swiss ZEWO (which refer to Swiss GAAP FER 21 for purposes of financial accounting and reporting, thereby demanding particularly comprehensive financial information) and the German DZI are considered to be especially exemplary (cf. Krönes, 2013; Stötzer, 2012; Schauer, 2004). In comparison to these, the most important donation seal of approval in Austria, the ÖSGS (Österreichisches Spendegütesiegel), is underdeveloped and has therefore only a limited impact on transparency. Critique can be expressed with regard to the small scope of prescribed financial reporting, missing definitions (e. g. what should be disclosed in decisive items such as administrative expense?) and insuffi-

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ciently specific requirements relating to a broader performance reporting (and thereby the disclosure of the extent of effectivity of the services rendered). Nevertheless, it is common to all these donation seals of approval mentioned above that they demand the disclosure of financial reports by the certified organisations. Thus, the financial information requested by these provisions is normally the only one available for the stakeholder groups of NPOs – esp. for donors, but also for further external and internal groups (which – not least – also include representatives of financial accounting research). Furthermore, notably rigorous provisions for the audit of certified NPOs are being set: The cooperation contract for awarding the Austrian donation seal of approval (ÖSGS), concluded between the Austrian Chamber of Chartered Accountants and Tax Consultants (KWT) and the NPO-umbrella organisations, demands for instance an examination of *“the compliance with the fundamental principles of frugality and efficiency with regard to the purpose of donation-financed activities”*, which can be compared to the requirements which have to be adhered to in a management and performance audit. Meeting such provisions of certain standards voluntarily is associated with higher levels of public support, thereby improving funding through charitable contributions (cf. e. g. Chen, 2009).

Finally, one has to portend that in the last years considerations were given to a **further promotion of transparency** in the third sector in the German-speaking area as well, such as by establishing the databases addressed before. These should create a comparable, comprehensive database for financial information of donation-collecting as well as not donation-collecting NPOs. However, the attempt to implement an offshoot of the GuideStar database ([www.guidestar.org](http://www.guidestar.org)) which is well established in the UK and the USA for Germany (cf. Vogelsang, 2008), did not succeed at last. The scarce legal requirements for the disclosure of financial information in combination with the low willingness for voluntary disclosures which has been signalled by the NPOs from the very beginning are seen as the main reasons for this (cf. thereto Vogelsang/Buttkus, 2005: pp. 36 ff.).

Other online-platforms with comparable goals, such as the one of Spenden.de, were neither able to establish themselves. Still: Whereas at least less comprehensive initiatives, such as the PwC-transparency price or the initiative for a transparent civil society (cf. ITZ, 2010) have become more important in Germany, such efforts are still largely missing in Austria.

### Design and results of the empirical study

The disclosed annual reports of the year 2011 of the 100 biggest donations-collecting NPOs in Austria (as measured by the total volume of donations received, statistics regularly published by the Fundraising Verband Austria [Austrian Fundraising Association]) formed the basis of this study. The volume of donations received by these NPOs ranged from 59.50 mio. € (Red Cross) to 0.42 mio. € (association of the blind and visually impaired in Tyrol). Donations amounting to more than 1 mio. € were collected by 58 NPOs (cf. thereto the guiding values according to § 22 Abs. 2 VerG [Austrian law for associations] for the classification of big associations which are required to have extended financial statements and an external audit). On average, the percentage of donations of the total revenues disclosed amounted to 68%. The NPOs studied were mainly engaged in social services (47) and set up as associations (80).

79 of the NPOs examined had been awarded the ÖSGS; nevertheless, the two biggest ones (Red Cross and Caritas) were not part of this group. Especially these organisations oppose the ÖSGS since its adoption; the homepage of Caritas in Upper Austria states: *“With our*

*management of finances, we fulfil the requirements of the donation seal of approval which is being awarded by the Austrian Chamber of Chartered Accountants and Tax Consultants (KWT). Caritas has not applied for this donation seal of approval because it is not meaningful enough – particularly regarding the quality of the projects funded. Caritas collaborates in deepening and substantiating the guidelines”* (Caritas Oberösterreich, 2014). Thereby, the voluntary renouncement is brought to the fore and at the same time the demand of the organisation to be trusted in respect to its financial management, especially due to their being well established (in the public).

In the beginning, a descriptive analysis of the contents of the annual reports was conducted, focusing on the kind of information obtained (which information was published?). In succession, we tried to derive the influencing factors on different reporting practices (which NPOs are the ones which disclose certain kinds of information?); due to the size of the sample examined and the big heterogeneity of the information found, we abstained from building a (complex) regression model and preferred a descriptive comparison with regard to size ranges and selected assessment dimensions. Finally, the results obtained were compared with the requirements of the ÖSGS’s criteria catalogue and the current debate in the professional literature.

The results of the study show that the disclosed annual reports deviate from the actually binding rules of the ÖSGS in important aspects: First, numerous **variances** from the layout provisions were found; to begin with, these referred to adaptations of and deviations from layout numbers or captions. However, more serious issues concerned the following disclosure problems which were frequently encountered:

- No distinction was made between dedicated and not dedicated donations.
- No separate disclosure of membership fees and subsidies and missing declarations whether these were shown in the donations or in other items.
- No or only very rough subcategorisations of the expenses into statutory expenses and expenses for fundraising and administration respectively. As Buchheit/Parsons, 2006: p. 667, already stated: “*only a minority of donors request and use financial information, however [...] there is a need for increased accuracy or not-for-profit expense classification*”, thereby reducing the scope of accounting manipulations.

Partly, these deficits might have been caused by a revision of the ÖSGS’s criteria catalogue in the reviewed year 2011. These provisions of the ÖSGS are subject to changes over and over again. So a newly revised ÖSGS-format was introduced due to the evaluation in 2010 (e. g. demanding a separation in the disclosure of dedicated and not dedicated donations, which had not been required before). This format should have been applied to all annual reports which ended after 31.12.2011 (cf. the ÖSGS-cooperation contract in the version of 2010: p. 10). In the evaluation 2011, the provisions were changed in the way that the new format would be already applicable to annual reports ending after 31.12.2010 (cf. the ÖSGS-cooperation contract in the version of 2011: p. 10). This might explain the observed deficits up to a certain extent, although a clarification would have been necessary in the course of the auditing of the Austrian donation seal of approval.

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**Voluntary data** – e. g. concerning the explanation of the disclosed financial information or the declaration of last year's figures – were missing for a large part. Thereby, only few NPOs disclosed more information than just the minimum required. Even obvious information such as the reporting date, the headcount or the auditor (of the financial statements and/or the donation seal of approval) was largely missing. The same applies to declarations concerning events after the reporting date and a general outlook to the coming years respectively. These are data which have been common in the notes and the (ever more expanded contents of) management discussions and analyses of corporate enterprises for a long time.

Furthermore, a lot of numerous other **disclosure obligations not directly related to financial information** were **breached**: For example, sporadically the organisational goals were not displayed and a third of the NPOs did not mention the responsible persons in their organisations incl. the management bodies.

A **performance report** which goes beyond financial numbers existed in most of the cases (79). These NPOs supported this kind of report with key performance indicators (KPIs), which almost exclusively consisted of absolute figures such as the number of cases or activity quantities (e. g. the number of drives, hours of care, projects etc.). Only four NPOs used more complex relational numbers. Thereby, only three different KPIs were observable (capacity utilisation rates, average length of stays and allocation of staff per client). Further impact indicators were missing throughout the sample. Most of the NPOs (70) used at least verbal explanations. In total, performance reporting can therefore be regarded as being less complex, but quite often more comprehensive than financial reporting; therefore, it receives obviously more attention than financial reporting by most NPOs.

**Financial reporting** of NPOs which **did not bear the ÖSGS** is in line with the criteria catalogue in many respects (e. g. as far as the display format of the source of funds and allocation of resources is concerned). This underlines the high relevance which the ÖSGS has with regard to the accountability of donations-collecting NPOs in Austria (creating a halo due to an unfolded spillover effect). At the same time, the disclosure of financial information is unsatisfactory: Five organisations did not make any kind of financial report available – even on inquiry. Furthermore, the approach of the Red Cross has to be viewed especially critical: As NPO with the biggest volume of donations received, it amounts its total volume of benefits in 2011 to 534.5 mio. € and in contrast the sum of donations and membership fees to 59.5 mio. € in an annual report which is available online but does not provide further information – especially concerning the application of funds.

In the financial reports of the NPOs with and without the ÖSGS, the reporting about the donations received and their usage was always in the focus; however, revenues and expenses out of **economic activities** were **addressed only seldomly**. It was not always possible to retrace whether this was due to the fact that there were no such activities at all or because the NPOs tried to avoid reporting about this topic. However, the latter becomes evident for NPOs such as the Caritas which indeed reported about the receipt and usage of donations in all their partial federations in Austria, but completely excluded the even more widespread scope of its economic activities.

Different practices due to various fields of activities could not be identified, whereby the deduction of valid conclusions was impeded by the partly very small number of NPOs in the single fields. By contrast, the **absolute amount of donations received** could be identified as most crucial **factor influencing** reporting practices. For the organisations identified as the biggest, a more comprehensive financial reporting could be determined (independent of having been awarded the ÖSGS or not) which e. g. encompassed more annotations or further

presentations of results. This can arguably be explained by more donors being interested in financial information in these organisations and the fact that these NPOs were subject to a higher level of public attention and scrutiny due to the high volume of donations they had received. But of course, these bigger NPOs are also the ones which have the necessary financial as well as personnel resources at their disposal in order to execute such a more elaborate reporting. However, no such correlation could be found with respect to the relative amount (percentage) of donations in relation to total income.

## Implications and questions for further research

A **culture of transparency** seems to be only very little developed in the examined organisations. This does not correspond with the claims made in the professional literature according to which the NPO-sector is increasingly being confronted with increased demands for such transparency – to which Greiling refers when she talks about the change “*from a ‘trust me-’ into a ‘show me-culture’*” (Greiling, 2009: p. 75). Here it seems that NPOs still seem to miss out that point and rely on the trust being established in the relationships to their stakeholders as they tend to minimal reporting standards. It can be assumed that this could turn out to be damaging for those NPOs; but the awareness for this possible risk seems to be largely lacking in these organisations so far.

On the basis of the findings discussed above, one can only conclude that currently there does not exist a qualitatively sufficient data base to perform meaningful comparisons between the NPOs. Little developed donation seals of approval such as the ÖSGS in Austria cannot remedy the attested transparency deficit.

In this light, an **improvement** of financial reporting of donations collecting NPOs does not seem to be very probable or effective if based solely on voluntariness. Specific requirements based on **binding norms** should therefore be preferred. Lawmakers and representatives of the NPO-sector itself (such as umbrella organisations in the NPO-sector) are required to act appropriately. Mechanisms such as the data bases and rating agencies, as discussed before, can make further contributions as soon as a better approach to financial information can be warranted.

We already hinted at **possibilities for further development** in the existing framework of financial reporting norms (e. g. comprehensive responsibilities to comment, declaration of last year’s figures, naming the auditor etc.). Esp. numerous undefined or respectively unclear concepts should be specified, eventually by taking the guidelines worked out by foreign donation seals of approval or similar norms as examples. Going beyond a simple coverage of the concepts in the form of checklists, esp. well-founded definitions would be required; simply taking them over from the context of for-profit enterprises would often lead to not really satisfying results. Furthermore, the mapping of economic activities which are increasingly gaining more importance in the third sector should be regarded more thoroughly; specific provisions (and supporting guidelines) related to performance reporting should be included as well (e. g. by referring to already established standards).

The detected deficits in the reporting of the organisations reviewed which had been awarded the ÖSGS raise the further question regarding the quality of the **audits** performed. If one takes the provisions of the donation seal of approval’s criteria catalogue seriously, this audit would be one of the most demanding in the field of auditing due to elements of a per-

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formance audit it entails. But because of the obvious deficits encountered, doubts arise. Therefore, it might be no coincidence that auditors themselves are not (or: do not want to be?) mentioned in the annual reports.

Low audit quality is also cited in international studies as one reason why audit fees charged to non-profit organisations were found to be lower than for audits in the for-profit sector (with lower audit risk and auditor altruism being two other possible explanations) (cf. e. g. Beattie et al., 2001). Interestingly, choosing a Big 5-auditor, which happens more frequently when the organisation relies more heavily on donations (cf. Tate, 2007: p. 58), apparently conveys a signal of financial data reliability, irrespective of the possible impact of having appointed an auditor: donations are higher and the impact of disclosed changes in donation price is more pronounced (cf. Kitching, 2009: p. 519). However, still it has to be concluded that the topic of “auditing of NPOs” is generally one which has not received much attention in German-speaking countries (and in some respect also internationally), bringing up many unresolved questions (cf. Baumüller, 2013).

The Austrian Chamber of Chartered Accountants and Tax Consultants (KWT) increasingly seems to become aware of this problem. The KWT can order the conduction of a special audit if doubts arise with regard to the quality of the executions and the results of audits of the donation seal of approval. Such special audits were conducted in 2012, thereby relating to the period examined in this article. As a result, at least one initially awarded donation seal of approval was actually withdrawn. Furthermore, continuative guidelines and checklists related to the ÖSGS and its audit were published – amongst others for terminological specifications and the separation of items to be disclosed, such as the administrative expenses, the fundraising costs etc. (cf. Houf/Wundsam/Schallmeiner, 2013: p. 84). Therefore, an improvement of financial reporting can be expected in the meantime.

Regarding the **determinants** of different **accounting practices** it can be concluded that those NPOs have achieved a higher stage of development of their financial reporting, which have a higher degree of visibility due to the big(ger) volume of donations received. Nevertheless, one should keep in mind that larger organisations can be expected to have better developed accounting and control systems in place not only to contain agency costs, but also due to operational reasons (cf. Jegers, 2011: p. 109). In further research, it would be interesting to find out whether a higher volume of donations received makes a better financial reporting simply more affordable for NPOs (as discussed above). Furthermore, it was shown that the relative significance of donations as a financing source is on its own not a driver for an improved reporting quality – although one could expect that it is especially important for these NPOs to secure the donations due to their central role as a financing source which in turn should prompt more efforts in the direction of improving one’s reporting. Finally, this underlines the relevance of the accountability debate and that trends in the environment of these organisations are central for the further development of the financial accounting and reporting of NPOs.

Finally, one has to note critically that donation seals of approval are instruments for building trust and as such should be of special interest for the NPOs as well as for their stakeholder groups. In respect to this paper’s discussions, they can be regarded as important promoters of the current accountability debate. Obtaining such a certification as well as the associated reporting requirements are nevertheless costly for NPOs, which raises the question regarding the **cost-benefit-relationship**. This also seems to play a role in the decision of numerous big NPOs not to obtain such a certification and to further rely instead on the trust of their donors which is possible due to their being well established. This aspect should not be

forgotten in the current debate – that transparency is not an end in itself and only meaningful up to a certain extent where it can be justified by appropriate and commensurate benefits created for the users of financial or other information. On this, admittedly, a factual debate still seems to be missing as well as accordingly reliable empirical data – at least in German-speaking countries. Hyndman, 1990, pp. 300 ff., for instance showed in his sample of larger British charities that donors prefer summary financial information instead of the full financial statements. What is even more, a danger exists that a competition with regard to the volume and quality of (financial) reports would sidetrack from the actual (impact) goals. Furthermore, this development could be at the expense especially of small NPOs, which quite often lack the know-how and the resources or even the consciousness for the necessity of adequately designed reports – but might serve e. g. as promoters of social innovations. One should not lose sight of these facts in the course of future studies to be undertaken related to financial accounting and reporting in donations-collecting NPOs.

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## A STUDY ON THE NON-LINEARITY OF OWNERSHIP CONCENTRATION

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**Abstract.** *There are mixed results in the non-linear relationship between ownership concentration and firm value on the one hand and debt on the other hand, where some of the studies found a ‘U-shaped’ non-linear association and some of them found the opposite, that is an ‘inverse U-shaped’ association. Therefore, the aims of this study are to investigate on the non-linear relationship between ownership concentration and firm value and the effect of this relationship towards debt level selection by ownership concentration. Using the public listed Malaysian firms in years 2007-2012, we employ two-step system generalised method of moments (GMM) estimation that corrects for the dynamic endogeneity issue. Our findings show that the ownership concentration of the largest shareholder monitors firm managers effectively at a low level of ownership and expropriates small/non-controlling shareholders at a high level. This ‘inverse U-shaped’ non-linear association does affect the non-linearity between ownership concentration of the largest shareholder and debt, but there is no definite evidence to conclude the second hypothesis.*

**Keywords :** *governance, ownership, non-linearity, firm value, performance*

**JEL classifications :** *C13, G32, G34*

### Introduction

As one of corporate governance mechanisms, large shareholders through their concentration of ownership have strong and direct incentives to monitor managers actively. However, whether large shareholders contribute to the solution of agency problems or whether they aggravate them remains questionable as there are inconclusive findings from previous research (Sánchez-Ballesta & García-Meca, 2007). For instance, as the suppliers of funds or capital, shareholders need to ensure that firm managers do not expropriate the funds on unattractive investments but generate returns from the investments. This is referred to as the Type I agency problem between shareholders and managers. Expropriation might also be undertaken by large shareholders at the cost of small shareholders. This is referred to as the Type II agency problem between large/controlling shareholders and small/non-controlling shareholders. In the words of La Porta, Lopez-de-Silanes, and Shleifer (1999, p.2), ‘the principal agency problem in large corporations around the world is that of restricting expropriation of minority shareholders by the controlling shareholders, rather than that of restricting empire building by professional managers unaccountable to shareholders’.

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Research on corporate ownership mostly focuses on insider or managerial ownership as a proxy rather than on large shareholders (Holderness, 2009), where the impact on firm value and debt might be different between these two types of ownership structure as large shareholders are assumed to have little affiliation to the firm's management, hence they might have different interests. In addition, there is a lack of literature on the relationship between debt and the ownership concentration of large shareholders, yet this is a unique relationship that is interesting to explore and also motivates this study to choose these two corporate governance mechanisms. The decision of shareholders, particularly large/controlling shareholders, to employ more debt or not would depend on whether or not they consider debt to be the most efficient corporate governance mechanism in the circumstances.

Therefore, it is a goal of this study to find whether ownership concentration and firm value are also non-linearly related in the Malaysian firms and, if they are, which shape this relationship is associated with. This finding will assist in answering the question of whether large shareholders, through their concentration of ownership, play a role as an effective monitoring mechanism on firm managers in mitigating the Type I agency problem between shareholders and managers, and/or whether they are expropriating firm small shareholders, thus creating the Type II agency problem between large/controlling shareholders and small/non-controlling shareholders. Another objective of this study is therefore to find whether ownership concentration and debt are also non-linearly associated in the Malaysian firms. Therefore, the study will be able to answer the question: If it is shown that ownership concentration is an effective monitoring mechanism and/or expropriates its small shareholders, how do these acts impact on firm debt selection?

This study applies the two-step system generalised method of moments (GMM) estimation method. The results show that the ownership concentration of the largest shareholder has an 'inverse U-shaped' non-linear association with firm value. Also, it is found that the non-linear relationship between the ownership concentration of the largest shareholder and firm value has an effect on the non-linearity between the ownership concentration of the largest shareholder and debt, but there is no definite evidence to conclude this.

### Literature review

Ownership concentration is measured by the amount of shares own by the investors that can either be the individual investors or the institutional investors. They can have a strong monitoring power towards the firm's decision as a form of incentive to protect their investment. As a result both managers and board of director are very concerned with the preferences and the interests of the substantial amount shareholders. This will indicate a strong governance power, that is those with large shares have the role to monitor the firm's management on the one hand and to expropriate small/non-controlling shareholders on the other hand.

The results from other studies evidenced non-linear relationships between ownership concentration and firm value; they are either quadratic (U-shaped or inverse U-shaped) or cubic relationship. Manawaduge, Zoysa, and Rudkin (2009) found the U-shaped association between these variables in the Sri Lankan companies that suggests the existence of market anomalies common to most of the emerging markets. This U-shaped relationship between ownership concentration and firm performance was also found in Liu, Uchida, and Yang (2012). On the other hand, Mazzola, Sciascia, and Kellermanns (2012) who used family ownership as a proxy for large shareholders found an inverse U-shaped relation

between family ownership and firm performance in privately held family firms in Italy. This is supported recently by Amzaleg and Barak (2013) who found an inverse U-shaped relationship between insider ownership and corporate performance and by Busta, Sinani, and Thomsen (2014) where the inverse relationship is found between blockholder ownership and performance in European Banks. In addition, Isakov and Weisskopf (2014) found a nonlinear concave function between the level of family ownership and performance where a high concentration and family firms are profitable than non-family controlling shareholders. Hence, we formulate the first hypothesis as follows.

*Hypothesis 1: There is a non-linear relationship between ownership concentration and firm value.*

Ownership structure become increasingly critical issue as it has important implication on firm performance by mitigating agency costs of the firm. Large numbers of research have been documented on the impact of ownership structure of which ownership concentration serves as a governance mechanism to control managerial decisions including corporate debt policy. Some drawings from the literature reviews attempt to demonstrate and support hypotheses that there is a linear and non-linear relationships between ownership concentration and corporate debt which associated with types and characteristics of ownerships, types of shareholder such as block shareholders, as well as investors' protection and legislation.

Bruslerie and Latrous (2012) investigated the relationship between controlling shareholders' ownership and corporate debt levels and found an inverse U-shaped relationship between these two variables. Thus, debt first increases (non-dilution entrenchment effect) and then decreases (risk reduction and incentive effect) with the cash flow rights of the controlling shareholders, since the structure of incentives changes as their holding increases. This finding is also supported by Zekri (2012) who found an inverse U-shaped relationship between equity participation of the controlling coalition and indebtedness, as well as by Setia-Atmaja, Tanewski, and Skully (2009) who found that family ownership and debt had an inverse U-shaped relationship at an inflection point of around 30%. On the other hand, Hu and Izumida (2008) found a significant U-shaped association between ownership concentration and debt. They concluded that large shareholders through their concentrated ownership do have an influence on firm debt financing decisions regardless of whether they expropriate minority shareholders or they act as an effective monitoring mechanism. As such, the second hypothesis is formulated as follows:

*Hypothesis 2: There is a non-linear relationship between ownership concentration and debt.*

As a conclusion, it is expected that ownership concentration plays dual-functions at a time towards firm value and debt. Hence, the present study attempts to investigate the non-linear relationship between ownership concentration and firm value and the effect of this relationship towards debt level selection by ownership concentration, particularly in Malaysian firms which have not been explored previously.

## Data and methodology

### Data

This study uses data that consists of all listed firms on Bursa Malaysia for the period of 2007-2012 obtained from OSIRIS, Thomson ONE Banker, Bursa Malaysia website and the firms' websites. In accordance with the usual practice, firms in the financial sector are excluded from the study, as well as foreign firms that may have different ownership structures. After excluding the missing observations of the dependent and independent variables, the final sample comprises 367 firms for tests.

The first dependent variable of this study is firm value and the proxy used is Tobin's  $Q$  ( $Q$ ), which is measured by the sum of year-end market capitalization and book value of total debt and book value of preferred shares scaled by book value of total assets. The second dependent variable is debt ( $D$ ) which uses debt ratio as the proxy measured by book value of total debt scaled by book value of total assets.

As for the independent variable, ownership concentration, we use the total percentage of ordinary shares owned by a firm's largest shareholder ( $OC$ ). Ownership concentration might have dual effects on firm value, either serving as an effective monitoring mechanism on managers (Jensen & Meckling, 1976; Shleifer & Vishny, 1986), or tending to expropriate on small shareholders (Shleifer & Vishny, 1997). The former will result in a positive effect on firm value, while the latter will have a negative impact. A negative (positive) effect of ownership concentration on debt is expected if ownership concentration plays its role as an effective monitoring mechanism, thus using debt as its substitute (complement) in order to control for agency costs. These hypotheses follow Friend and Lang (1988), Miguel et al. (2005) and Hu and Izumida (2008). On the other hand, if ownership concentration expropriates the minority shareholders, it will result in a negative effect on debt due to the intention to use free cash flow for its perquisite, as the disciplinary effect of debt become weaker (Jensen, 1986). In addition, a positive effect on debt can be a signal that ownership concentration tends to expropriate the small shareholders in order to maintain the large shareholders' percentage of ownership in the firm or it can be a defensive tactic against a takeover attempt. Also, it might be a fake signalling message to external investors either to show that they do not mind being bonded with fixed obligations carried by debt (Du & Dai, 2005), or that their intention is to mitigate the possibility of agency costs (Hu & Izumida, 2008).

Several control variables used in the tests are as follows:

1. Board independence ( $IND$ ): Measured by the proportion of outside members in board. The hypotheses are this variable has a positive effect on firm value and has a positive or negative effect on debt.
2. Investment ( $INV$ ): It is estimated by the capital expenditure scaled by book value of total assets. Investment could also represent the production capability of a firm. Hence, investors might anticipate good future prospects for the firm, thus enhancing firm value (Hu & Izumida, 2008). Through its impact on firm value, investment can positively or negatively relate to debt.
3. Firm size ( $SI$ ): To control for this firm size, we use natural log of book value of total assets. Size might negatively affect firm value as, if size is too large, there is a possibility that the firm has a high

agency cost and difficulties in monitoring, which would reduce firm value. This hypothesis follows Himmelberg et al. (1999). Firm size and debt are expected to be positively related as a larger firm has a lower probability of financial distress due to the tendency to be more diversified (Setia-Atmaja et al. 2009).

4. Firm age (*AGE*): This study uses natural log of number of years since the firm's incorporation to control for firm age. Age is expected to have a negative effect on firm value and debt, as young firms are seen to have better growth prospects (Ritter, 1991).

5. Growth opportunities (*GROWTH*): It is estimated by the current value of sales less lagged value of sales scaled by lagged value of sales. The hypothesis is growth opportunities positively affect firm value and debt.

6. Change in assets turnover (*AT*): It is measured by sales scaled by assets change; where it is defined as current value of sales scaled by book value of total assets less lagged value of sales scaled by book value of total assets. Firm value and debt can be positively influenced by change in assets turnover as a high turnover of assets indicates that the firm is efficient in generating income (Thomsen et al. 2006).

7. Dividend (*DIV*): This study uses dividend yield to control for this variable. Firm value is expected to be positively influenced by the dividend. On the other hand, debt is expected to be negatively influenced by dividend as they are substitutes financing mechanisms.

#### *Estimation models and method*

The following equations are estimated in order to test our hypotheses:

$$Q_{it} = \lambda_0 + \lambda_1 OC_{it} + \lambda_2 OC_{it}^2 + \lambda_3 D_{it} + \lambda_4 IND_{it} + \lambda_5 INV_{it} + \lambda_6 SI_{it} + \lambda_7 AGE_{it} + \lambda_8 GROWTH_{it} + \lambda_9 AT_{it} + \lambda_{10} DIV_{it} + X_{it} \quad (\text{Model 1})$$

$$D_{it} = \lambda_0 + \lambda_1 OC_{it} + \lambda_2 OC_{it}^2 + \lambda_3 Q_{it} + \lambda_4 IND_{it} + \lambda_5 INV_{it} + \lambda_6 SI_{it} + \lambda_7 AGE_{it} + \lambda_8 GROWTH_{it} + \lambda_9 AT_{it} + \lambda_{10} DIV_{it} + Y_{it} \quad (\text{Model 2})$$

where  $i$  and  $t$  denote firm and year, respectively. The dependent variables are  $Q$  which is firm value in model 1 and  $D$  which is debt in model 2. The independent variables are the linear and quadratic functions of the largest shareholder's ownership concentration,  $OC$  and  $OC^2$  respectively. The following are the control variables:  $IND$ ,  $INV$ ,  $SI$ ,  $AGE$ ,  $GROWTH$ ,  $AT$  and  $DIV$  which denote board independence, investment, firm size, firm age, growth opportunities, change in assets turnover and dividend respectively.  $X_{it}$  and  $Y_{it}$  are the error terms. Firm-specific effects  $\eta_i$  and time-specific effects  $\omega_t$  are used to control the unobservable firm-specific and time-specific, respectively. Hence, the error terms  $X_{it}$  and  $Y_{it}$  are transformed into  $\eta_i + \omega_t + \varepsilon_{it}$ , where  $\varepsilon_{it}$  is the random disturbance.

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This study employs the two-step system generalized method of moments (GMM) estimation method that not only controls the unobserved heterogeneity across firms and over time, but also the dynamic endogeneity and simultaneity effects. To take into account on the panel-specific autocorrelation and heteroskedasticity, Windmeijer corrected robust standard errors is used in GMM estimation. In addition, the instrument set is tested for validity by conducting an analysis based on the Hansen test (Hansen, 1982) of the full instrument set and the Difference-in-Hansen test of a subset of instruments for over-identifying restrictions ( $H_0$  = Valid instruments). As such, both tests require the failure to reject the null hypothesis. As the estimator assumes that there is no serial correlation in the error term,  $\varepsilon_{it}$ , tests for serial correlation are conducted where the residuals in the first differences (AR1) should be correlated, but in the second differences (AR2) there should be no serial correlation (Arellano & Bond, 1991).

### Findings and Discussion

#### *Descriptive Statistics*

Table 1 presents the summary statistics of the variables used in this study. Tobin's Q shows a mean value of 0.75, as well as minimum and maximum values of 0.07 and 7.69 respectively. Applying the essential interpretation, the mean of Tobin's Q found in this study indicates that, on average, the market value of the Malaysian firms is 0.75 lower than the value of the firms' total assets.

The mean value of debt ratio is 0.23. This is virtually the same as found in other studies such as Setia-Atmaja (2009) and Setia-Atmaja et al. (2009), where the mean of debt ratio is 0.22 and 0.227 respectively. Further, the debt ratio has a minimum of 0.00 and maximum of 0.82.

As can be seen in the table, the mean value of the ownership concentration of the largest shareholder is 28.06%. This suggests that the largest shareholder in the Malaysian firms have a fairly concentrated ownership. Setia-Atmaja (2009) defines ownership concentration by categorizing the sample firms as closely-held or widely-held firms. Firms are categorized as closely-held if a firm has at least one shareholder who controls at least 20% of the firm's equity. In addition, the largest shareholder's ownership concentration also ranges from a minimum of 0.42% to a maximum of 86.81%.

The mean for the control variables used in this study are: board independence 0.44, investment 3.88, firm actual age 24.48, growth 10.81, change in assets turnover 0.78, dividend 1.84 and total assets representing firm size 1,100.97.

Table 1: Summary of descriptive statistics

	Mean	Std Deviation	Minimum	Maximum
Tobin's Q	0.75	0.58	0.07	7.69
Debt ratio	0.23	0.16	0.00	0.82
Largest shareholder (%)	28.06	16.14	0.42	86.81
Board independence	0.44	0.13	0.11	0.89
Investment	3.88	5.25	0.00	73.40
Firm actual age	24.48	16.66	1	98
Growth	10.81	50.05	-94.73	776.51
Change in assets turnover	0.78	0.60	0.02	5.53
Dividend	1.84	2.39	0.00	17.02
Total assets (RM millions)	1,100.97	635.19	1	2,200

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### *Regression Analysis*

The study conducts the non-linear tests by using the GMM estimation as presented in Table 2 which shows the results of both model 1 and model 2.

Table 2: Non-linearity tests

Variable	Model 1	Model 2
	$Q$	$D$
$OC$	0.035* [1.87]	0.003 [0.76]
$OC^2$	-0.000* [-1.71]	-0.000 [-0.63]
$Q$		-0.010 [-0.62]
$D$	0.400 [0.99]	
$IND$	-0.389 [-0.91]	-0.092 [-1.49]
$INV$	-0.000 [-0.04]	0.004 [1.63]
$SI$	0.114* [1.70]	0.013 [1.19]
$AGE$	-0.040 [-0.62]	-0.100 [-1.29]
$GROWTH$	-0.001* [-1.65]	0.000 [1.00]
$AT$	0.265** [2.58]	-0.011 [-0.62]
$DIV$	-0.017	-0.009**

	[-1.05]	[-2.39]
AR(1)	-1.87	-3.55
[P-value]	[0.062]	[0.000]
AR(2)	-1.19	0.86
[P-value]	[0.232]	[0.389]
Hansen test	32.14	44.86
[P-value]	[0.908]	[0.436]
Difference-in-Hansen test	24.64	33.24
[P-value]	[0.853]	[0.456]
F statistics	39.22	468.27
[P-value]	[0.000]	[0.000]
Time effects	Included	Included
Firm effects	Included	Included

Models and variables employed are explained in the previous section. All variables on the right-hand side are treated as endogenous variables. Robust t-statistics are presented in parentheses. \*\* and \* denote statistical significance at 5% and 10% levels respectively.

In table 2, model 1 shows that OC has a non-linear association with Tobin's Q as the coefficients of OC linear and quadratic functions are positive and negative respectively. These coefficients are significant at the 10% level of significant. The 'inverse U-shaped' non-linear association indicates that, at a low level, a positively significantly association between the largest shareholder's ownership concentration and firm value is found and, at a high level of the largest shareholder's ownership concentration, they are negatively and significantly related. This finding supports the monitoring and expropriation hypotheses where ownership concentration might be an effective monitoring mechanism at a lower level, but not when the level is too high, when the market will react negatively due to the expectation of expropriation on small shareholders. It suggests that the agency problems between largest and small shareholders are more serious when the largest shareholder holds a higher percentage of the company's shares.

For the control variables; it is found that size, growth and change in assets turnover are significantly related to Tobin's Q. The hypothesis of the relationship between size and firm value is not evidenced as it is found that the former is positively related with the latter at the 10% significance level. This suggests that larger Malaysian firms are valued higher by the market due to the perception that they are better performers than the smaller firms. A negative association between growth and firm value at the 10% level of significant also verifies that the hypothesis is not evidenced, which remains a puzzle. Consistent with the hypothesis, a positive relationship between change in assets turnover with firm value where they are significant at the 5% level suggests that Malaysian firms are efficient in generating income.

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In table 2, model 2 exhibits that the coefficients of the linear and quadratic functions of OC when regressed on debt ratio are positive and negative respectively. It indicates that at a low level of the largest shareholder's ownership concentration, debt increases as the largest shareholder's ownership concentration increases and, at a high level of the largest shareholder's ownership concentration, debt decreases as the largest shareholder's ownership concentration increases. As model 2 is regressed simultaneously with model 1, it suggests that first, under the monitoring effect, it is suggested that ownership concentration and debt are compliments. In addition, the expropriation effect reveals that ownership concentration lowers the debt level in order to avoid the disciplinary role of debt and to reduce risks by not employing a high debt level. However, there is no firm evidence that ownership concentration is non-linearly related with debt, as the linear and quadratic functions of the explanatory variable are insignificant. This suggests that in Malaysian firms, the largest shareholder through his concentrated ownership might be employing other corporate governance mechanisms to compliment his monitoring effectiveness and to conceal his expropriation act.

In this model, the only control variable that is significantly associated with debt is dividend where a negative relationship is found at the 5% level of significant. This supports the hypothesis that these two financing mechanisms are substitute and it is consistent with Hussainey and Aljifri (2012). As for the other variables, this model suggests that firm value, board independence, investment, size, age, growth and change in assets turnover are not the determinants of debt.

### Conclusion

This study attempts to investigate on the non-linearity between ownership concentration and firm value on the one hand and debt on the other hand. This is to find out whether large shareholders through their concentrated ownership plays dual-functions at a time and if it does exist what is the effect of these functions towards debt level decisions. Thus, the present study attempts to verify the results on the roles played by ownership concentration towards firm value and debt, in light with mixed results being found previously. Also, at the best of our knowledge, this is the first study that investigates these hypotheses by employing the most current data set and using Malaysian firms as its research setting.

Employing the GMM estimation method, it is found that the ownership concentration of the largest shareholder plays an effective monitoring mechanism on firm managers at a low level but expropriates small shareholders at a high level of ownership. This 'inverse U-shaped' non-linear association does affect the non-linearity between ownership concentration of the largest shareholder and debt, where debt is used as a compliment by the largest shareholder when he effectively monitors managers but when the largest shareholder expropriates small shareholders, he tends to exploit debt by lowering the debt level. Nevertheless, the non-linearity between ownership concentration and debt cannot be concluded firmly as the relationships found are not significant.

The findings can be beneficial especially to the small/non-controlling shareholders and potential investors in suggesting to look at the percentage of ownership owned by the largest shareholder in a firm before making an investment decision. It is suggested not to invest in a firm if its largest shareholder holds a high percentage of ownership as he tends to expropriate the small/non-controlling shareholders. This study also could assist Malaysian government to decide on corporate governance policy, particularly on ownership structure of largest shareholder by restricting him to hold too high percentage of ownership in a firm as to avoid him from expropriating the small/non-controlling shareholders. It is

worthwhile to note that the present study does not identify the ownership structure of largest shareholder that is whether it is government ownership, institutional ownership, family ownership or individual ownership. We propose this to be an avenue that can be explored in future.

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# FORECASTING IN A VOLATILE ENVIRONMENT: AN EMPIRICAL STUDY OF LARGE AUSTRIAN COMPANIES AND SMES

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**Abstract:** *Forecasting is one of the fundamental instruments in the budgeting process, as it is utilized by companies for the prediction of their planning factors through qualitative and quantitative forecast methods with varying degrees of complexity. In the last years the growing volatile business environment has companies struggle with this predictability of their budgets. Now, the question is if Austrian companies are also affected by this increasing volatility in their forecasting behaviour?*

*The objective of this paper is a dual approach, first focus is set on the overall analysis of forecasting practices of Austrian companies in a volatile environment. The second focus is a further comparison of forecasting behaviour between small and large Austrian firms. Do large firms use more appropriate methods? And, as a consequence, are SMEs and the quality of their forecasts more affected by volatility due to their lack of personal resources? This study provides answers to both objectives and shall be used as a basis for further empirical analysis and discussion.*

**Keywords:** *Forecast, Budgeting, Volatility, Forecast Methods, Large Companies, SMEs*

**JEL-classification:** *M41, C53*

## Introduction

The business environment of large firms is characterized by uncertain environments, shifting demographics, disruptive technologies, new industries and competitors and other challenges. (Raspin and Terjesen, 2007; Sandalgaard, 2012) . Mainly due to the financial crisis of 2008 and the European sovereign debt crisis of 2011, the fluctuations of sales, procurement and finance markets have increased significantly. A tendency to increasing volatility and uncertainty can not only be recognized at a macroeconomic level, but in single industries as well as in single companies. This increasing volatility is considered by Horváth as the biggest challenge of sustainable corporate management. In order to deal with this challenge, companies have to organize their systems of governance and control more efficiently (Horváth, 2012; Schäffer and Botta, 2012; Wulf *et al.*, 2012).

VUCA, short for volatility, uncertainty, complexity and ambiguity, has become the “new normal” business environment. A study by Simon Kucher & Partners states, as three quarters of surveyed managers claim, that VUCA has increased since the financial crises and will increase further (Kucher, Simon & Partners, 2011). Until this point, the budget has represented an important control system in almost all organizations (Hansen and Van der

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Stede, 2004) and has gained in importance (Rickards, 2008). Because of or perhaps despite this uncertainty, several studies confirm the continued increase in budgeting activities (Weber *et al.*, 2010; Waniczek, 2012). But this overwhelming speed of change, as Friedman calls it (Friedman, 2005), leads to the classical dilemma of budgeting: Despite the increase in their planning resources, companies struggle with their budgeting process and they experience a decline in the predictability of their budgets. This challenge is not solved by the abolishment of budgets, the main problem is based on the difficulty in forecasting itself (Rieg, 2008).

This forecast function, as stated in different studies, is considered an important element of the budgeting process (Weber *et al.*, 2010; Hofer *et al.*, 2013). As the quality of the forecast function is very much dependent on the dynamics of the external and internal planning factors, VUCA reduces companies' forecasting capabilities. Austrian companies therefore have to think about suitable qualitative and quantitative forecast methods to predict their future. An appropriate selection of forecast techniques may therefore serve as a basic function for high performing companies. On the other hand, limited training, limited know-how, especially in the fields of mathematics, and limited resources can lead to unsatisfactory forecast quality (Flores *et al.*, 2007).

A variety of studies have already dealt with forecast techniques ( (Mccarthy *et al.*, 2006; Mentzer and Kahn, 1995; Makridakis and Taleb, 2009a; Makridakis *et al.*, 2009), selection criteria of forecast methods ( (Armstrong, 2001; Mccarthy *et al.*, 2006; Mentzer and Kahn, 1995) and the assessment of forecast functionalities in ERP- and CPM-environments (Catt, 2008; Catt *et al.*, 2008; Lawrie *et al.*, 2004). Other studies have provided general frameworks on forecasting in volatile business environments in the D-A-CH-region (Weber *et al.*, 2010; Waniczek, 2012; Schäffer *et al.*, 2012) or focus on forecast techniques for volatile planning factors in Austrian SMEs (Hofer *et al.*, 2013)

The objective of this paper is a dual approach, the first focus is on the overall analysis of forecasting practices of Austrian companies in a volatile environment. The second focus is a further comparison of forecasting behaviour between small and large Austrian firms. Do large firms use more appropriate and complex methods, meaning good forecasting is a matter of scale? And, as a consequence, are SMEs and the quality of their forecasts more affected by volatile planning factors due to their lack of personnel? This study examines these questions, providing answers to the detailed research questions below and shall be used as a basis for further empirical analysis and discussion:

*RQ) WHAT IS THE STATUS OF THE FORECAST BEHAVIOUR OF AUSTRIAN COMPANIES IN A VOLATILE BUDGETING ENVIRONMENT? CAN SIGNIFICANT DIFFERENCES BETWEEN SMEs AND LARGE COMPANIES BE ASCERTAINED*

The following sub-categories are relevant to answer our main research question:

*SRQ1) HOW SEVERELY HAVE AUSTRIAN COMPANIES BEEN AFFECTED BY VOLATILITY?*

*SRQ2) TO WHAT EXTEND ARE SELECTED INTERNAL AND EXTERNAL PLANNING FACTORS PREDICTABLE IN SMEs AND LARGE AUSTRIAN COMPANIES?*

*SRQ3) WHICH FORECAST METHODS ARE UTILIZED BY AUSTRIAN SMEs AND LARGE COMPANIES?*

*SRQ4) WHICH SELECTION CRITERIA FOR FORECAST METHODS ARE RELEVANT IN A VOLATILE BUSINESS ENVIRONMENT?*

## VUCA and volatile Planning Factors

Although volatility and uncertainty are often used synonymously, in economics there is a subtle difference. Volatility is a mathematical metric that describes the possible variation of a particular economic variable (Aizenman and Pinto, 2004). Uncertainty describes several possible outcomes of the associated planning factors, but the assignment of probabilities to the outcomes is not possible (Aizenman and Pinto, 2004; Wright and Goodwin, 2009). In addition to this unpredictability, the planning environment of companies is shaped by complexity and ambiguity. The variety and dynamics of external and internal factors increases the planning complexity, whereas ambiguity characterizes the room for interpretation and ambivalence, causing a lack of clarity in the budget process (Hofer *et al.*, 2013).

To avoid difficulties in the wording of the definition of VUCA in the empirical section of our paper, we subsume, according to Horváth, under the working definition of volatility the unpredictable fluctuation of the individual internal and external planning factors, whose patterns can hardly be forecast or cannot be forecast at all. (Horváth, 2012). In his paper, Horváth claims that a macroeconomic consideration of volatility is too sweeping as it can only be evaluated from an individual standpoint of each company. Similar to the five-forces-model of Porter (Porter, 1980) he suggests an adapted seven-forces-model, including additionally the volatile fields “environment” and “economy” to analyse the single position in a differentiated manner. Hofer, Weingartmair and Eisl analyse the forecasting behaviour in the budgeting process of Austrian SMEs and found that they experience a strong volatility in their business environment and this increased volatility is perceived as the main reason for inaccuracy in their forecasts (Hofer *et al.*, 2013). Weber and Zubler analyse in their “WHU-Controllerpanel” the impact of the crisis and the volatile business environment by longitudinal surveys of CEOs, CFOs and managerial accountants in the D-A-CH-region. Their results reveal an increased perception of the crisis and its impact on the business environment by large companies compared to SMEs. Additionally the study illustrates that single industries, such as machinery and plant engineering, or the electrical industry, are more strongly affected by the changed environment compared to other industries.

A survey by Simon Kucher & Partners asked CEOs of Austrian manufacturing industry about their management strategies in a volatile environment. Three quarters of the surveyed managers claim that volatility has increased in Austria since the financial crises and will increase further (Kucher, Simon & Partners, 2011). The study especially proves that this increased volatility is perceived more intensely by small manufacturing companies in Austria. This result is also confirmed by Parnell and Lester, who give additional evidence that executives in SMEs interpret environmental volatility differently than those in established organizations.

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From these studies some evidence can be found that the perception of volatility is dependent from the organizational scale and the type of a company, showing significant differences between large and small companies and between single industries. Thus the following hypothesis, stated in null form, can be generated and tested:

*HO\_1A: THERE IS NO SIGNIFICANT DIFFERENCE IN THE PERCEIVED INFLUENCE OF VOLATILITY BETWEEN AUSTRIAN SMEs AND LARGE AUSTRIAN COMPANIES.*

*HO\_1B: THERE IS NO SIGNIFICANT DIFFERENCE IN THE PERCEIVED INFLUENCE OF VOLATILITY BETWEEN SURVEYED INDUSTRIES.*

The analysis of our study focuses on volatile external and internal planning factors in the fields of procurement, production, sales and finance. From a risk management perspective the correlated risks can be further categorized into economic performance related risks and financial risks. As a basis for the empirical section of our paper, specific planning factors were selected to represent the entire planning spectrum and the different risk categories, without claiming completeness and were further classified as shown in Table 1 (Wolke, 2007):

Table 1: Planning factors and related risk categories

Planning factor	Risk category	Subcategory
Raw material price	Performance related Risk	Procurement Risk
Capacity	Performance related Risk	Production Risk
Capacity Utilization	Performance related Risk	Production Risk
Sales price	Performance related Risk	Sales Risk
Sales	Performance related Risk	Sales Risk
Interest rates	Finance Risk	Market Price Risk
Exchange Rates	Finance Risk	Market Price Risk

## Forecast Methods

### *Qualitative and Quantitative Methods*

For each of the considered internal and external planning factors assumptions have to be established through forecast methods. These budget assumptions have to be continually modified due to dynamic planning factors and rapidly changing information. There are several available principles which can be used to group forecast methodologies, such as distinctions between statistical and non-statistical methods, time series analysis versus causal methods or a further technical differentiation between qualitative and quantitative methods. Authors have sub-classified qualitative and quantitative methods in judgmental, counting, time series or causal methods (Georgoff and Murdick, 1986) or divided the quantitative methods in time series analysis and econometric methods (Makridakis and Wheelwright, 1977).

Table 2: Qualitative and Quantitative Methods

Qualitative Method	Quantitative Method	Subcategory
Expert Forecasting	Time Series Analysis	Trend Extrapolation
Delphi Method		Extrapolation by Moving Average
Scenario Method		Exponential Smoothing
Analogy Method	Econometric Method	Regression Analysis
Indexing Method		

The first fundamental analysis of the utilization of forecast methods and the accuracy of their predictability is achieved by *Makridakis and Winkler*. They state in their paper that the combination of several methods compared with a single forecasting technique is beneficial for the accuracy of the prediction, representing an alternative if a single “best” forecasting method cannot be identified (Makridakis and Winkler, 1983).

*Makridakis and Taleb* describe in their papers the limited predictability of forecasts due to a volatile and uncertain environment, worsened by so-called “Black Swans”. These rare events represent statistical outliers with huge negative impacts like recessions or the financial crises. Inaccurate forecasts have caused serious consequences in the last few decades, but still the majority of forecasters believe in the reliable assessment of uncertainty and the creation of accurate forecasts. By using four concrete data sets the authors prove the opposite, stating that “Our ability to predict the future is limited, with the obvious consequence of high levels of uncertainty.” By clustering forecasting methods into three types of prediction (relying on patterns, utilizing relationships as a basis for forecasts, and human judgment as the dominant determinant for the forecast) their study discusses related forecast accuracy (Makridakis and Taleb, 2009a).

In a further article *Makridakis, Hogarth and Gabi* follow this argumentation of limited predictability of the future, thereby distinguishing uncertainty in a predictable future (called subway uncertainty) from a non-predictable, totally unexpected future (called coconut uncertainty). To handle uncertainty it is important to know which type of uncertainty you have to deal with, subway uncertainty, coconut uncertainty or a combination of both. Statistical forecast methods are usually appropriate for handling subway uncertainty. They state that the discipline of forecasting has achieved good results in modelling this subway uncertainty, but ignored coconut uncertainty and a priori unforeseeable black swans, as those are nearly impossible to model (Makridakis *et al.*, 2009). *Goodwin and Wright* review forecast methods supporting the anticipation of rare, high impact events. They also reveal that all extant methods are problematic in predicting these rare events. Besides providing protection by the organization against such negative events, organizations and its individuals should enhance their anticipation by using an appropriate combination of components like devil's advocacy, dialectical inquiry, Delphi method and scenario planning (Goodwin and Wright, 2010).

The change of sales forecasting management practices over the past 20 years is analysed by *Mccarthy et al.* After comparing the empirical research on forecasting techniques published since 1994 the authors investigated current forecasting management practices, distinguishing between three forecast horizons ( <3 months, 4 months – 2 years, > 2 years ). By means of an online survey, familiarity with forecast techniques, levels of satisfaction, usage and accuracy of forecast methods and system support were analysed. The obtained results reveal a lack of familiarity by users with sales forecasting techniques, creating a

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“black box” effect. This is also the main explanation for the decline in the forecast accuracy over the observation period, meaning that forecast techniques are not used properly (Mccarthy *et al.*, 2006). Pilinkienė concludes that effective forecasting of market demand in competitive markets can not only be based on statistical methods, recommending a combination of quantitative analysis of market information and qualitative factors of market demand, such as goals and economic characteristics of the market model (Pilinkienė, 2008).

Several studies have concentrated on forecast behaviour in the EU, in particular focusing on top companies in the UK (Smith *et al.*, 1996; Barrett and Hope, 2006) or analysing scenario forecast methods in the European mobile communication industry (Forge *et al.*, 2006). Buettner and Kauder review the practice and performance of revenue forecasting and its differences in selected OECD countries (Buettner and Kauder, 2010). Uncertainties, like macroeconomic risks, structural changes in the economy or in tax laws challenge forecasters in all countries. They reveal substantial differences in the precision of the forecasts between the countries driven by differences in timing, forecast methods, institutions and tax structure.

Austrian SMEs basically utilize extrapolation of past figures by different mathematical methods in their forecast process, mainly by trend extrapolation. This dominant method is partially supplemented by single expert opinion, other qualitative and quantitative techniques as forecast techniques are rarely used (Hofer *et al.*, 2013). The utilization of forecasting techniques in Canada is surveyed by Klassen and Flores, comparing their results with those of US firms. Forecasts are mainly used for budget and planning purposes, most frequently in marketing and sales, and the main use is similar to the US. In both states judgment methods are most common, whereas quantitative techniques, causal and newer methods are not used as much in Canada as in the US. Also combinations of techniques are rarely utilized, and when, only up to combinations of two or three methods.

Herbig, Milewicz and James compared the forecasting behaviour of industrial product firms and consumer product firms (Herbig *et al.*, 1994). Besides an unexpected high similarity in forecasting behaviour, forecasting duration and process and overall satisfaction with this process, several significant differences between these two samples were observed. Consumer firms perceive a greater accuracy in their forecast process, whereas on the other hand, industrial product firms utilize Salesforce Composite, competitive forecasting, forecasting of industry trends and Jury of Executive techniques more often. Smith, Herbig, Milewicz and Golden analyse the differences in forecasting methods between small and large companies in the US. As an impetus they use Greiner's Model of organizational growth to compare forecast methods, timeliness and satisfaction with forecasting in the initial and mature phases of a company's growth (Greiner, 1972). The results of the study prove the model's assumption that larger firms employ significantly more staff for forecasting activities than smaller ones and focus more on quantitative than on qualitative methods in their forecasting processes. But despite this increased effort, and contrary to Greiner's model, no significant difference in accuracy, forecast timeliness and satisfaction with the forecasting process between SMEs and large companies could be determined by the authors (Smith *et al.*, 1996).

A dual focus on the differences of forecasting techniques is established by Flores, Stading and Klassen, comparing organizational size and type of business. On the one hand, the authors concentrate on the different forecasting behaviour of large and small firms, on the other hand, their paper investigates differences in forecasting behaviour of manufacturing and service firms in Canada (Flores *et al.*, 2007). One main conclusion is that firms using quantitative methods face fewer forecast errors, regardless of organizational size. Large firms use a mix of quantitative and qualitative methods more often, also supported by a greater availability of resources compared to small companies. In general, the authors state that the

forecast accuracy of larger firms is better than those of small firms, enhanced by the supplementary use of qualitative forecast methods by quantitative techniques.

Based on the literature discussed, the proposition arises that the predictability of forecasts and the utilized methods differ according to company size. Therefore, the second and the third hypotheses are formulated as follows:

*H0\_2: THERE IS NO SIGNIFICANT DIFFERENCE IN THE PERCEIVED PREDICTABILITY OF INTERNAL AND EXTERNAL PLANNING FACTORS BETWEEN SMALL AND LARGE AUSTRIAN FIRMS.*

*H0\_3: THERE IS NO SIGNIFICANT DIFFERENCE IN THE UTILIZATION OF FORECAST TECHNIQUES (QUALITATIVE AND QUANTITATIVE) BETWEEN AUSTRIAN SMEs AND LARGE AUSTRIAN COMPANIES.*

### *Forecast Method Selection Rules*

*Armstrong* developed a flow chart to guide forecasters in selecting from several forecast methods. The main key findings are that quantitative methods are more accurate if enough objective data is given. Additionally, the knowledge about relationships, amount of change involved, extent of domain knowledge and the need for policy analysis have to be considered in choosing the correct forecast method in terms of accuracy (*Armstrong*, 2001).

Besides the environmental circumstances, like the availability of enough objective data, other relevant criteria for the selection of forecast methods have to be taken into consideration. *Armstrong and Yokum* describe in two studies selection criteria for forecast methods. By examining expert opinions of selection criteria in *Study One*, they establish a further distinction in the roles of forecasters (researcher, practitioners, educators and decision makers) to detect significant differences. All groups rated accuracy in first place as the dominant criterion, particularly accuracy was ranked highest by the group of researchers. In contrast, decision makers ranked implementation-related criteria like ease of use and interpretation or flexibility relatively higher than other groups, being almost as important as accuracy. In *Study Two*, the authors analysed variations of forecast method selection criteria driven by the nature of the forecasting situation. Forecast situations differ according to the amount of data available (long or short time-series), the number of forecasts required (many or few forecasts), and the method used (extrapolation or econometric models). For some forecasts, accuracy represents once again the dominant criteria. Besides accuracy, the ease of interpretation was more important for econometric techniques, whereas ease of use and ease of using available data and the time to provide forecast results was highly rated for extrapolation methods (*Yokum and Armstrong, J. Scott*, 1995).

Further studies in the field of sales forecasting confirm accuracy and credibility as equally important selection criteria. Although significantly lower than the aforementioned top selection criteria, both studies identify ease of use and customer performance as important forecast selection criteria. Cost and return on investment are ranked lower in terms of forecast effectiveness, showing that the impact of forecast techniques on financial measures is considered less in firms' evaluations (*Mccarthy et al.*, 2006; *Mentzer and Kahn*, 1995). The dominating selection criteria of forecast methods for Austrian SMEs are the accuracy and the ease of interpretation of the utilized category. Additionally, flexibility and resource requirement are surveyed as important experienced factors in the forecast process of small firms in Austria (*Hofer et al.*, 2013).

In their research, *Herbig, Milewicz and James* reveal unexpected high degree of similarity in forecasting behaviour, forecasting duration and process and overall satisfaction with this process between consumer and industrial product firms. They rate the output of the used forecast techniques by the eight criteria of effectiveness, ease of use, accuracy,

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simplicity, meaningfulness, timeliness, understandability, and satisfaction with the process (Herbig *et al.*, 1994). In a further analysis, *Smith, Herbig, Milewicz* and *Golden* surveyed large and small firms in the UK with the same eight criteria to evaluate their forecast behaviour. Also in this study many similarities were discovered in the perception of the forecast process, showing nearly the same levels for comprehension, meaning, effectiveness, timeliness, satisfaction and accuracy (Smith *et al.*, 1996). Thus, the following final hypothesis is proposed:

*H0\_4: THERE IS NO SIGNIFICANT DIFFERENCE IN THE RELEVANCE OF SELECTION CRITERIA FOR FORECAST METHODS BETWEEN SMALL AND LARGE AUSTRIAN COMPANIES.*

## Methodology

### Data Collection and Analyses

The empirical research process is built up by the sub-processes of data collection and data analysis, and, according to *Edmondson and Mcmanus*, is further detailed in specific phases as shown in Figure 1 (Edmondson and Mcmanus, 2007):

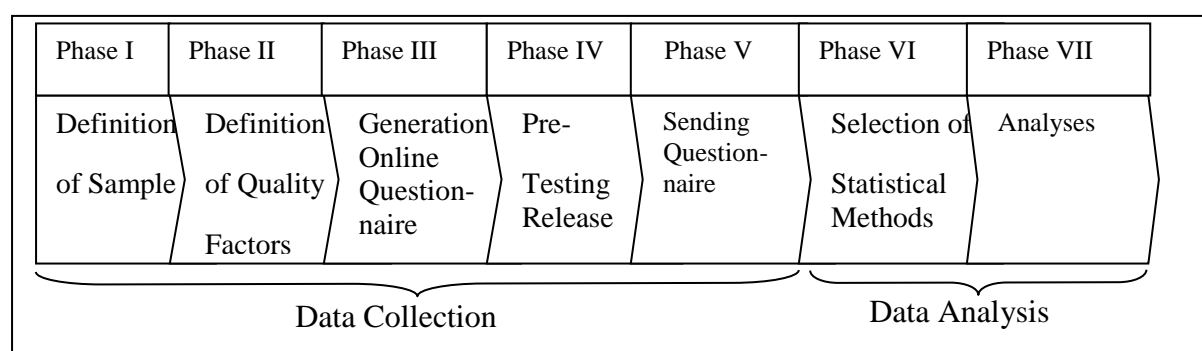


Figure 1: Research process

The data collection (Phase I-V) was conducted by means of a quantitative online-survey. A questionnaire was sent out to a sample of small and large Austrian companies. The definition of a SME and a large company in this study follows the classification of the IfM Bonn (Institute for SME Research in Bonn), stating that a firm with less than 500 employees is characterized as a SME, and one with more than 500 employees as a large company (Hagenlocher, 2009). We utilized the Herold Marketing Database (an Austrian database containing contact information, finance and employee data of about 100,000 companies) as the primary database, further validating the received contact details with the datasets “News: Top 1000” and “Trend Top 500”. Applying these criteria resulted in 3051 contact details.

The authors defined experience in the forecasting process as an important quality factor. Therefore, besides company size and industry, position in financial accounting, controlling or treasury and years in business of the respondent were requested in our questionnaire. Multiple-choice questions to rate the forecasting process, predominantly answered on bipolar 5-point Likert scales, and one open question concerning the impact of VUCA on budget and forecast process were additionally included.

After pretesting, sending the questionnaire via e-mail and utilizing the defined quality criteria, a data set of 199 evaluable questionnaires was received (response rate of 16.9%). Due to the defined quality criteria (questionnaire answered by expert and confirmation of budget use) 22 questionnaires were not considered in the data analysis.

Table 3 gives an overview of the resulting 177 respondents, clustered by company size, sector and job position:

Table 3: Details of respondent characteristics

Distribution of respondents on Size			Distribution of respondents on Sector			Distribution of respondents on Position		
Size	Frequenzy	Percentage	Sector	Frequenzy	Percentage	Position	Frequenzy	Percentage
25-50	14	8%	Industry	115	65%	Head of Controlling	79	45%
51-100	15	8%	Services	15	8%	Controlling	25	23%
101-500	42	24%	Financial Services	12	7%	Head of Finance & Accounting	33	19%
501-1000	51	29%	Wholesales / Retail	20	11%	Head of Accounting	18	10%
1001-2000	24	14%	Construction	15	9%	CFO	9	5%
2001-5000	16	9%	<b>Total</b>	<b>177</b>	<b>100%</b>	CEO	12	7%
5001-10000	8	5%				Accounting	1	1%
>10000	7	4%				<b>Total</b>	<b>177</b>	<b>100%</b>
<b>Total</b>	<b>177</b>	<b>100%</b>						

Following our research questions and hypotheses, the questionnaire is clustered into different sections:

- (1) Impact of Volatility
- (2) Predictability of planning factors and relationship to perceived volatility
- (3) Utilization of forecast methods / Reasons for non-satisfactory forecasts
- (4) Analysis of forecast selection criteria

As regards section (3) our paper utilizes the approach of *Makridakis and Wheelwright* with the distinction between more qualitative or quantitative oriented methods as a formal categorization of forecasting techniques, but does thereby not further differentiate between the single time series analysis subcategories. Based on the reviewed literature, the following selection criteria were utilized in section (4):

- Accuracy
- Flexibility
- Timeliness
- Ease of interpretation
- Ease of use
- Ease of implementation

To test the internal reliability of the defined constructs of predictability and selection criteria Cronbach alpha has been calculated. The calculation of Cronbach's  $\alpha$  for the defined measures in our questionnaire is shown in

Table 4. A significantly high reliability of data for selected categories can be ascertained, as all values exceed 0.6 (Singh *et al.*, 2013).

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Table 4: Details of the measures used

<i>Details of Measures Used</i>		
Construct	Cronbach Alpha	Items
Predictability of planning factors	0,633	6
Selection criteria forecast method	0,683	6

Subsequent to the descriptive statistics, correlation analysis utilizing Spearman's Rho to evaluate significant relationships was conducted. T-Test for independent samples was used to examine significant differences in impact of volatility and forecast characteristics between SMEs and large Austrian companies, ANOVA was additionally utilized to analyse if industries differ significantly from each other.

The chosen research design causes limitations in our study. An empirical analysis which is based on a standardized online-survey gives no possibility to deal individually with the respondents and may lead to a false interpretation of the included questions. The reasons for the chosen answers by the specific respondents can only be assumed by the added open question at the end, additional restrictions are imposed by the limited number of possible answer options.

## Results

### *Analysis of Volatility*

Our first research question focuses on the impact of volatility on SMEs and large Austrian companies. To ensure a common understanding of all recipients, volatility was defined in the questionnaire, followed by an assessment using a five-point-Likert scale. The authors utilized descriptive statistics to answer our first research question:

*SRQ1) HOW SEVERELY HAVE AUSTRIAN COMPANIES BEEN AFFECTED BY VOLATILITY?*

92 companies, representing 52% of the sample (N=177) answer that they are currently severely or extremely severely hit by volatility (see Figure 2). Only few companies (3) of our sample state that they are not affected at all by the current volatile environment.

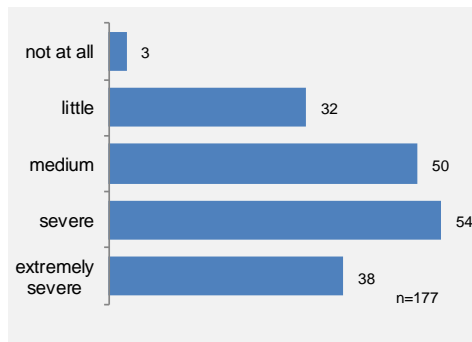


Figure 2: Impact of VUCA

In order to answer our first hypothesis H0\_1a, a t-test for independent samples, combined with a Levene Test to assess the equality of variances was conducted to analyse if there are significant differences in the perceived impact of volatility between small and large firms. Table 6 shows that volatility impacts SMEs significantly more than large Austrian companies, thus H0\_1a can be rejected.

Table 5: Group Statistics impact of volatility between small and large firms

Impact of Volatility		N	Mean	Standard deviation	Standard error of the mean
	Large Company	106	3.05	.919	.089
	SME	71	4.23	.882	.105

Table 6: T-Test for differences of the perceived impact of volatility between small and large Austrian firms

Impact of Volatility	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	T	df	Sig. (2-tailed)
Equal variances assumed	0.029	0.864	-8.494	175.00	.000

To test hypothesis H0\_1b, the authors additionally investigated the perceived differences of the impact of volatility dependent on the type of industry. Prior to the analysis of variances (ANOVA), a Levene-Test was carried out, proving homogeneity of variances ( $p = 0.06$ ). Table 8 shows the results of ANOVA, which revealed no significant differences between group means of volatility influence of the surveyed industries. The findings of ANOVA were therefore insufficient to reject null hypothesis H0\_1b.

Table 7: Group Statistics Impact of volatility between industries

	N	Mean	Standard Deviation	Standard Mean Error	Minimum	Maximum
Manufacturing	115	3.70	1.053	.098	1	5
Services	15	3.07	.799	.206	2	4
Financial Services	12	2.75	.866	.250	2	4
Retail/Wholesale	20	3.35	1.309	.293	1	5
Building/Construction	15	3.47	.915	.236	2	5
Total	177	3.52	1.072	.081	1	5

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Table 8: ANOVA for differences in the impact of volatility between surveyed industries

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.366	4	3.592	3.289	.013
Within Groups	187.814	172	1.092		
Total	202.181	176			

## *Analysis of the predictability of planning factors / relationship with perceived volatility*

Subsequent to the impact of volatility, the authors focus on the predictability of the surveyed planning factors and their links to the perceived influence of volatility. The second research question, as mentioned above, addresses these issues as follows:

*SRQ2) TO WHAT EXTENT ARE SELECTED INTERNAL AND EXTERNAL PLANNING FACTORS PREDICTABLE IN SMEs AND LARGE AUSTRIAN COMPANIES?*

To answer SRQ2, companies in the first stage had to state on a five-point-Likert scale (1=not at all, 5=extremely severe) the difficulties in predicting different external and internal planning factors of the budget process (compare Table 1). After analysing the surveyed results and testing hypothesis H0\_2, the authors conducted a correlation analysis utilizing Spearman's Rho in a second stage to verify a relationship between the impact of volatility and the predictability of the single planning factors.

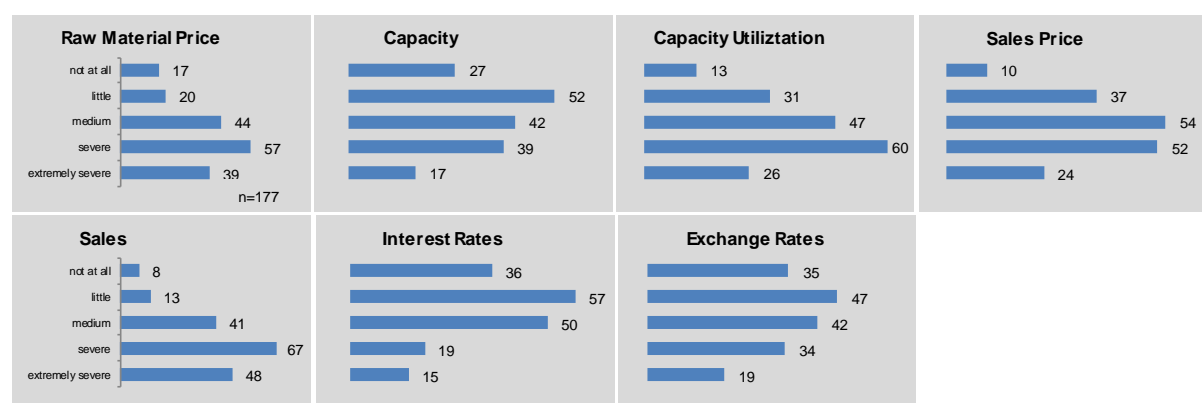


Figure 3: Difficulties in the predictability of the planning factors related to VUCA

Due to volatile and uncertain sales and commodity markets, Austrian companies face difficulties in predicting the external planning factors of sales, sales price and raw material price. Figure 3 shows that 65% of the respondents are severely or extremely severely challenged in their sales forecast, which leads to additional impacts on the predictability of the companies' capacity utilization (49%). The predictability of raw material prices (54%) and sales prices (43%) are also affected by volatility. The forecasting of capacity (32%) and the financial planning factors of exchange rates (30%) and interest rates (19%) is less impacted by the perceived volatile business environment. Taking into consideration all planning factors, only one third of the surveyed firms state that they have no or only a few difficulties in the predictability of their forecasting.

By means of a t-test for independent samples, Hypothesis H0\_2 was analysed regarding significant differences in the perceived predictability of the surveyed planning factors. The authors expected to see great differences in the forecasting predictability. But similar to the study of *Herbig, Milewicz and James* more similarities than differences could be observed

(Herbig *et al.*, 1994). Only the planning factor of raw material price differed significantly ( $\alpha < 5\%$ ) between small and large firms (compare Table 10), all other planning factors showed comparable perceived prediction quality. Thus, besides the factor of raw material price, the findings were not sufficient to reject H0\_2. Therefore, the hypothesis of no significant perceived differences in the predictability of the forecasting between small and large firms can be accepted.

Table 9: Group statistics predictability of planning factors

Predictability of planning factors		N	Mean	Std. Deviation	Std. Error Mean
Raw Material Price	Large Company	106	3.20	1.290	.125
	SME	71	3.85	1.009	.120
Capacity	Large Company	106	2.94	1.293	.126
	SME	71	2.62	1.074	.127
Capacity Utilization	Large Company	106	3.33	1.248	.121
	SME	71	3.28	.974	.116
Sales Price	Large Company	106	3.37	1.098	.107
	SME	71	3.06	1.094	.130
Sales	Large Company	106	3.68	1.126	.109
	SME	71	3.87	.985	.117
Interest Rates	Large Company	106	2.54	1.228	.119
	SME	71	2.56	1.105	.131
Exchange Rates	Large Company	106	2.71	1.234	.120
	SME	71	2.80	1.338	.159

Table 10: T-Test for differences in the perceived predictability of planning factors

Predictability of planning factors		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Raw Material Price	Equal variances not assumed	5.322	.022	-3.732	170.747	.000
Capacity	Equal variances assumed	1.984	.161	1.744	175	.083
Capacity Utilization	Equal variances not assumed	8.059	.005	.290	170.860	.772
Sales Price	Equal variances assumed	.381	.538	1.853	175	.066
Sales	Equal variances assumed	2.104	.149	-1.180	175	.239
Interest Rates	Equal variances assumed	2.106	.148	-.142	175	.888
Exchange Rates	Equal variances assumed	.253	.616	-.487	175	.627

Table 11 shows the correlation of the volatile business environment and the predictability of the planning factors, calculated by Spearman's Rho. The results show that sales and raw material price correlate positively and significantly with volatility. As the prediction of sales quantity and raw material price cause the most severe difficulties in the firms' budget process, this confirmation of a significant relationship with the perceived volatile environment is not surprising.

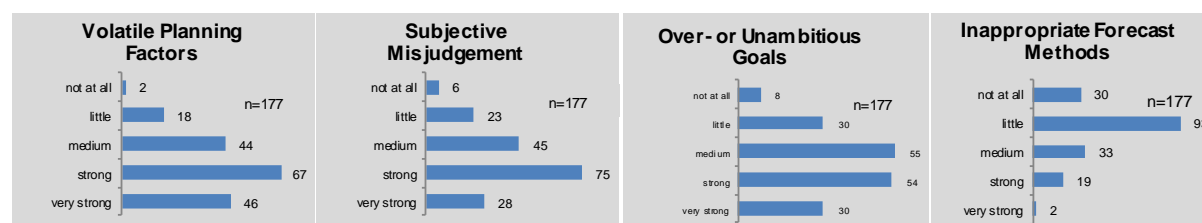
Table 11: Correlation of volatility with the difficulties in the predictability of the surveyed planning factors

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Correlation	Raw Material Price		Capacity		Capacity Utilization		Sales Price		Sales		Interest Rates		Exchange Rates	
	Rho (p)	p-Value	Rho (p)	p-Value	Rho (p)	p-Value	Rho (p)	p-Value	Rho (p)	p-Value	Rho (p)	p-Value	Rho (p)	p-Value
Volatility	0.294**	0.000	0.067	0.378	0.102	0.179	0.057	0.453	0.251**	0.001	0.019	0.799	0.055	0.467

Besides the predictability of internal and external planning factors, our study investigates possible reasons for the current unsatisfactory forecasting in the budget process (Lapide, 2009; Makridakis and Taleb, 2009b). The respondents of our questionnaire had to answer on a five-point-Likert scale how severe specific reasons cause dissatisfaction with the forecasting process (1=not at all, 5= extremely severe). Apart from the impact of volatility, the authors asked in the questionnaire for other factors like subjective misjudgement, over- or unambitious goals and inappropriate forecast methods.

Figure 4: Impact of specific reasons for dissatisfaction with forecasts



As shown in Figure 4, volatility represents the main reason for dissatisfaction in the forecasting of budget processes. 113 responses consider this factor as a strong or very strong reason (64%), followed by subjective misjudgement (103 / 58%) and over- and unambitious goals (84 / 47%). On the other hand, the low number of answers “strong” or “very strong” demonstrates that small and large Austrian companies feel confident in using appropriate forecasting techniques (21).

### Utilization of forecast methods

This perceived utilization of appropriate forecast methods is more deeply analysed by SRQ3.

SRQ3) WHICH FORECAST METHODS ARE UTILIZED BY AUSTRIAN SMEs AND LARGE COMPANIES?

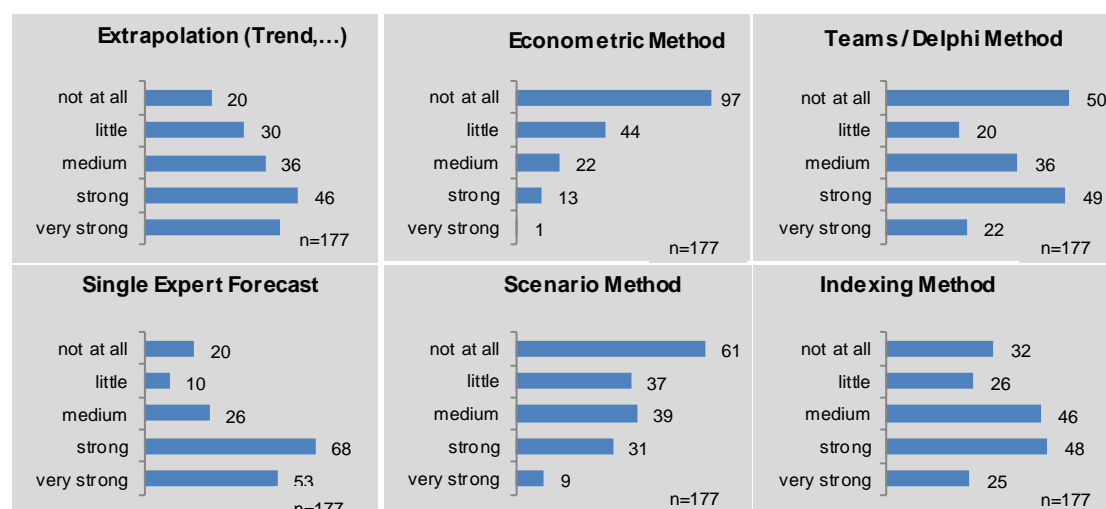


Figure 5: Utilization of forecast methods

The answers of the respondents, illustrated in Figure 5, prove that Austrian companies utilize the technique of single expert forecast the most (68% strong and very strong use), followed by extrapolation of past figures with trend or moving average (51%), indexing method (41%) and expert forecasting in teams / Delphi Method (40%). The Scenario method (55% no or little use) and especially econometric methods (80%) are rarely used in small and large Austrian companies.

Table 12 illustrates the descriptive statistics of the utilization of forecast methods for small and large Austrian firms. By analysing the means of the single forecast methods the authors observed notable differences between the sample groups. Whereas the method of extrapolation from past figures (Trend,...) is predominantly used by small companies, all other techniques are, compared to SMEs, more intensively utilized by large Austrian companies. Especially forecasting by expert teams and the Scenario method are rarely employed by Austrian SMEs.

Table 12: Group statistics utilization of forecast methods

Utilization of forecast methods		N	Mean	Std. Deviation	Std. Error Mean
Extrapolation (Trend,...)	Large Company	106	3.03	1.222	.119
	SME	71	3.89	1.326	.157
Econometric Method	Large Company	106	1.99	1.037	.101
	SME	71	1.37	0.741	.088
Teams / Delphi Method	Large Company	106	3.50	1.098	.107
	SME	71	1.87	1.275	.151
Single Expert Forecast	Large Company	106	3.92	0.836	.081
	SME	71	3.37	1.675	.199
Scenario Method	Large Company	106	2.92	1.088	.106
	SME	71	1.58	1.065	.126
Indexing Method	Large Company	106	3.18	0.993	.096
	SME	71	2.85	1.662	.197

Thus, again a student's t-test for independent samples was utilized to disprove null hypothesis H0\_3 and thereby determining significant differences in the use of forecast techniques. All forecast methods (see

Table 13), besides indexing method, show significant differences in their utilization between large and small companies. Hypothesis H0\_3 therefore has to be rejected to a large extent, thereby excluding the indexing method.

Table 13: T-Test for differences in the utilization of forecast methods

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		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Extrapolation (Trend,...)	Equal variances assumed	1.298	.256	-4.428	175	.000
Econometric Method	Equal variances not assumed	9.654	.002	4.668	174	.000
Teams / Delphi Method	Equal variances assumed	1.756	.187	9.051	175	.000
Single Expert Forecast	Equal variances not assumed	99.656	.000	2.600	94	.011
Scenario Method	Equal variances assumed	0.457	.500	8.087	175	.000
Indexing Method	Equal variances not assumed	49.369	.000	1.522	104	.131

### *Analysis of the selection criteria of forecast methods*

Besides the utilization of forecast methods, it was important to examine the respondents' selection criteria for forecast techniques as represented in SRQ4:

*SRQ4) WHICH SELECTION CRITERIA FOR FORECAST METHODS ARE RELEVANT IN A VOLATILE BUSINESS ENVIRONMENT?*

To answer this question, large Austrian companies were asked for the importance of specific selection criteria (as defined in chapter 4). This information was gathered via a five-point-bipolar Likert scale (1=not important, 5=very important) across the six dimensions of selection criteria. As shown in Figure 6, ease of interpretation (81% important and very important), flexibility (74%) and accuracy (72%) represent the most important selection criteria of forecast techniques in Austrian companies. The other criteria, namely timeliness, ease of use and ease of interpretation of forecast results are nearly as relevant as the top-ranked criteria. The analysis clearly proves that accuracy is not the only important criterion for forecasting in Austrian companies. Especially ease of forecasting, as regards the interpretation of the forecast results and the implementation and the use of methods has the same significance.

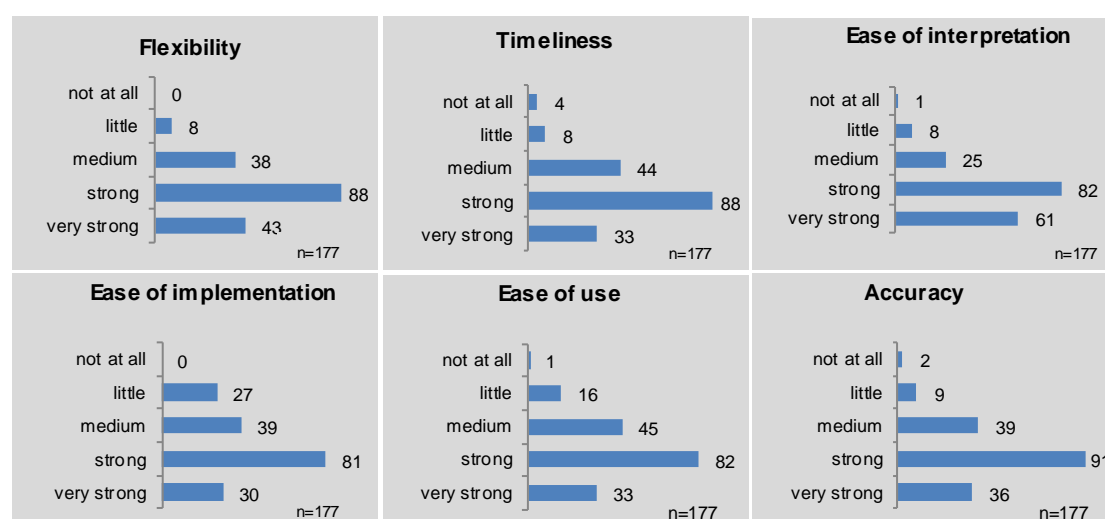


Figure 6: Selection criteria of forecast techniques

By additionally investigating the differences of selection criteria for forecasting techniques between SMEs and large companies the authors observed similarities in the criteria of flexibility, ease of use and accuracy (Table 14).

Table 14: Group statistics selection criteria of forecast methods

Selection criteria of forecast methods		N	Mean	Std. Deviation	Std. Error Mean
Flexibility	Large Company	106	3.90	0.827	.080
	SME	71	4.00	0.756	.090
Timeliness	Large Company	106	3.63	0.919	.089
	SME	71	4.00	0.775	.092
Ease of interpretation	Large Company	106	3.87	0.874	.085
	SME	71	4.44	.670	.080
Ease of implementation	Large Company	106	3.46	0.997	.097
	SME	71	3.92	0.770	.091
Ease of use	Large Company	106	3.78	0.916	.089
	SME	71	3.66	.844	.100
Accuracy	Large Company	106	3.88	0.859	.083
	SME	71	3.80	0.821	.097

Table 15 illustrates that no significant differences for the above mentioned criteria can be determined, therefore confirming the assumptions and null hypothesis H0\_4. The remaining selection criteria timeliness, ease of interpretation and ease of implementation differ significantly between the sample groups. Those criteria are more important for SMEs than for large companies. Due to the lack of resources of small firms, less complex methods which are easy to use and show less duration between forecasts and results received are utilised. These results are fully comparable to other studies ( Flores *et al.*, 2007; Smith *et al.*, 1996) and allow us only partly to reject H0\_4.

Table 15: T-Test for differences in the selection criteria of forecast techniques

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Flexibility	Equal variances assumed	3.457	.065	-0.846	175	.398
Timeliness	Equal variances not assumed	11.906	.001	-2.872	166	.005
Ease of interpretation	Equal variances assumed	0.572	.451	-4.643	175	.000
Ease of implementation	Equal variances not assumed	17.636	.000	-3.404	171	.001
Ease of use	Equal variances assumed	0.523	.471	0.889	175	.375
Accuracy	Equal variances assumed	0.293	.589	0.576	175	.565

The final results of our hypothesis-tests are shown in the summary below:

Hypothesis H0_1a	Rejected
Hypothesis H0_1b	Accepted
Hypothesis H0_2	Accepted
Hypothesis H0_3	Mainly Rejected

## Conclusion

The dual focus of our study was, on the one hand, to provide an overall analysis of the forecast behaviour of Austrian companies and on the other hand, to assess, if small and large Austrian firms use forecast methods differently in a volatile business environment. To answer our main research question, the authors established subcategories of research questions, which can be answered as follows:

Corporate management of Austrian companies has been intensely hit by volatility, the majority of the companies stated that they were severely or even extremely severely affected by this increasing volatility. Whereas the comparison of the surveyed industries does not support a significant difference in their perceived volatility, the analysis in terms of firm size shows that SMEs experience the volatile business environment significantly more severely than large companies. Given the more limited resources of SMEs this result could be foreseen, possibly caused by less accuracy in their forecast methods

This experienced volatility represents the major reason for the dissatisfaction of Austrian companies with their forecasts. In their forecasting process the firms are especially challenged in the prediction of their sales quantities and raw material prices. A correlation analysis, calculated by Spearman's Rho, reveals a significantly positive link between the predictability of exactly these two planning factors and the perceived volatile environment. For nearly all planning factors, apart from raw material price, similarities in the perceived predictability between small and large firms were observed, thus confirming our null hypothesis. Despite an expected greater number of personnel and related to that a higher availability of expertise in forecast techniques, large companies face the same issues in the prediction of single planning factors as SMEs.

Austrian companies apparently use, from their point of view, appropriate forecast techniques, which they do not experience as a reason for dissatisfying forecast results. But this assessment is not based on the utilization of different combinations of complicated forecast techniques as our study reveals that time series methods, basically in form of trend extrapolation of past figures and single expert opinion are the most commonly used techniques. More complex methods, like econometric methods and Scenario technique are rarely used.

Although technical knowledge is important for either sample group, the authors, similar to other papers (Flores *et al.*, 2007; Smith *et al.*, 1996) have the a priori expectation that the better position of large companies for the deployment of resources leads to the development of an adequate mixture of sophisticated qualitative and quantitative methods. Empirical evidence is found showing significant differences in the utilization of forecast categories based on firm size, thus rejecting the null hypothesis of similar forecast behaviour. Austrian SMEs base their forecast figures on the extrapolation of past figures through mathematical methods and the opinion of single experts. In contrast to our expectations, large firms use qualitative categories of forecasting methods more extensively than SMEs, such as opinions of single experts or expert groups and market indicators, which are supported by the quantitative technique of extrapolation of past figures. The anticipated high degree of utilization of complex quantitative methods involving a large number of people was not found in our results. Economic methods are used only to a small extent by large Austrian companies.

The answers of the surveyed sample show that currently the most important selection criteria concerning forecasting methods are the flexibility and accuracy of the method, as well

as the ease of interpretation of the results. It is, however, recognizable that all selection criteria are reasonable close, demonstrating that in times of crises forecast methods have to fulfil all these criteria at the same time. Our hypothesis, that the surveyed selection criteria are similarly important for both sample groups is only partly valid for the categories of flexibility, ease of use and accuracy. On the other hand, SMEs rate the timeliness of results higher than large firms, comparable to other studies which observe shorter durations between forecast and results received. Less sophisticated methods which allow an easy interpretation and reduced efforts in their implementation are also due to their limited resources, significantly more highly favoured by small firms.

The answer to our main research question shall provide a better overall picture of the forecast behaviour in Austria and can be summed up by the following main points:

- Austrian companies experience the predominant volatile business environment which affects them in their forecasting process. Small firms perceive this volatility significantly more than large Austrian companies.
- The prediction of the sales quantities and the related raw material prices is the firms' most challenging forecast task, as the firms perceive a positive link between the forecast predictability of these fundamental planning factors and the strongly perceived volatility in these markets. No distinction in this prediction can be determined between small and large firms.
- The expected change from more qualitative to more quantitative forecast techniques in the phase of organizational growth is not confirmed. Large firms use a broader spectrum of qualitative methods than small firms, but the utilization of complex quantitative methods like linear regression is not relevant for both sample groups.
- Firms require a wide range of criteria which forecast techniques have to fulfil in the predominant volatile environment. Although management request these forecast qualities like accuracy or flexibility, (which differs to a degree between small and large firms), the current usage of less sophisticated methods reveals a gap between intention and reality.

Our study clearly points out that Austrian practitioners, regardless of firm size, do not exploit the entire set of forecast instruments which are taught by academics. Similar to the recommendation of other studies (Forge *et al.*, 2006; Flores *et al.*, 2007; Smith *et al.*, 1996) the authors suggest that a combination of both quantitative and qualitative techniques, drawing on the best of both worlds so to speak, could provide a more accurate forecast, based on the latest technology and the knowledge and experience of seasoned practitioners. Companies that supplement their qualitative techniques by sophisticated quantitative ones should expect less forecast bias and more satisfaction with their future predictions. This means that the management of Austrian companies, regardless of size, should expend more effort to build up technical know-how and possibly by additional increasing capacities, improve their forecast behaviour in a targeted way. Their future business environment can only be managed by a holistic, flexible forecast process which is able to adapt to the constantly changing volatile conditions.

*Further research activities*

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The authors consider a future enhancement of their current research design with regard to a mixed method approach. The importance of possible mediating variables for example qualification of management or type of leadership, may be scrutinized in the form of expert interviews and provide the opportunity to expand the existing survey by incorporating these variables.

As regards content, the extended questionnaire can also be used to gather further detailed information on forecast methods, but also address issues like forecast bias or forecast horizon, that have not yet been considered. In addition, an enhancement of the comparison of different industries, the inclusion and comparison of empirical forecast data of other countries or a longitudinal study by means of time series analysis may deepen and extend the acquired results.

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# DOMESTIC VOLATILITY TRANSMISSION BETWEEN SECTORS OF THE NIGERIAN ECONOMY

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**Abstract:** *Volatility transmission between sectors of a market or an economy is important to successful portfolio selection and hedging strategy within the domestic economy. This paper examines domestic volatility transmission between sectors of the Nigerian economy using Multivariate Generalised Autoregressive Conditional Heteroscedasticity (MGARCH) procedure. The central focus is to evaluate the nature and direction shock and volatility transmission between the banking sector, the consumer goods sector and the Shari'ah compliant equities sector of the Nigerian Stock Exchange (NSE). The results indicate existence of unidirectional shock and volatility transmission from the banking sector to the consumer goods sector and the Shari'ah compliant equities sector, and bidirectional shock and volatility transmission between the consumer goods and the Shari'ah compliant equities sectors of the NSE. These findings have crucial implications for domestic portfolio selection and management through the hedging opportunities available in the NSE sectors.*

**JEL Classification Numbers:** G11, G32, C32

**Keywords:** *volatility transmission, sectors of economy, BEKK-GARCH Model, Nigeria*

## Introduction

A good understanding and accurate prediction of volatility transmission between assets, sectors or market returns are crucial to successful portfolio selection and hedging strategy. Financial assets and market returns are generally influenced by the portfolio decisions of investors who actively participate in more than one financial market. In turn, these decisions are usually influenced by a continuous flow of information that often results in market price volatility spillover within and across markets (Hurditt, 2004). Investors' major objective is to minimise the risk exposure of their portfolios while maintaining their expected returns. Along this line, Fleming, Kirby and Ost diek (1996) assert that, as a portfolio manager considers the correlation between different market returns, he will take a position in one market in order to hedge his speculative position in another. It is, thus, extremely important to understand the volatility linkages within the domestic financial market and the interrelationships with international

## DOMESTIC VOLATILITY TRANSMISSION BETWEEN SECTORS OF THE NIGERIAN ECONOMY

financial markets. To this extent, understanding the banking, consumer goods and Shari'ah equities sectors' volatility linkages will provide means to hedge against the sectoral risks emanating from shocks that persist within any of the sectors and those that may arise from the market as a whole.

Numerous empirical studies have considered volatility transmission across international financial markets (see, Hamao, Masulis and Ng, 1990; Kanas, 2000; Worthington and Higgs, 2004; Valadkhani, Harvie and Karunanayake, 2013). Other studies have also concentrated on volatility transmission across markets in the same economy (see, Turkeyilmaz and Balibey, 2013; Emenike, 2014). There are also very few studies that have examined volatility transmission across sectors of the same market (see for example, Malik and Ewing, 2009; Arouri, Jouini and Nguyen, 2011). While majority of these studies were conducted mainly for developed and recently for emerging financial markets, such evidence is either not available or scant in the case of Nigeria.

The major objective of this study therefore is to augment the findings already obtained on volatility transmission in both developed and developing financial markets by providing an answer to the question: What is the nature of volatility transmission between the banking sector, consumer goods sector and Shari'ah compliant equities sector of the Nigerian Stock Exchange (NSE)? Answer to this question is important to risk management and hedging strategy. In the presence of volatility transmission, a shock in one of the sectors could have a destabilizing impact on the other sectors. If, for instance, there is comovement of volatility between these sectors, investors will look for other sources to hedge against risk. Thus, the nature of volatility transmission will improve sector risk-sharing, enhance portfolio selection and hedging as well as enrich extant literature. Immediately preceding this introduction is Section 2, which contains brief review of empirical literature. Section 3 describes methodology and data for analysis. Section 4 presents empirical results, and section 5 concludes.

### **Brief Review of Related Empirical Literature**

While a considerable number of empirical studies have examined volatility transmission across international financial markets, few studies have explored volatility transmission across markets in the same economy, and fewer studies have investigated volatility transmission across sectors of the same economy. One of the earliest studies of volatility transmission across international markets is Hamao, Masulis and Ng (1990), which analyse the short-run interdependence of prices and price volatility across London, New York and Tokyo stock markets in the pre-October period. They show evidence of price volatility spillover from New York to London, from New York to Tokyo and from London to Tokyo but not in other directions. Similarly, Worthington and Higgs (2004) examine the transmission of equity and volatility among three Asian developed markets (Japan, Hong Kong, and Singapore) and six Asian emerging markets (Indonesia, Korea, Malaysia, Philippines, Taiwan, and Thailand), and find evidence of positive mean and volatility spillover. Their results also show that own stock market spillovers were generally higher than cross-volatility spillovers for all markets. Valadkhani, Harvie and Karunanayake (2013) examine the dynamics of cross-country GDP volatility transmission, and find that shock influences are mainly exerted by the larger economies onto the smaller economies. Other studies of volatility transmission across countries include Koutmos and Booth (1995), Kanas (2000), among others.

Apart from exploring volatility transmission in financial markets across different countries, researchers have also studied the volatility linkages between in domestic markets and, even sectors of an economy. Some examples of studies that examine volatility transmission across different markets of the same economy include, Turkyilmaz and Balibey, (2013), which examine the relationship between interest rate, exchange rate and stock price using BEKK-MGARCH approach. They conclude that there is significant transmission of shocks and volatility among the three variables. Emenike (2014) examines volatility transmission between stock and foreign exchange markets in Nigeria. His results show evidence of bidirectional shock transmission between the stock and foreign exchange markets, and a unidirectional volatility transmission from the foreign exchange market to the stock market. Other studies include Ebrahim (2000), Kim (2013), and so on.

The few literature on volatility transmission among sectors of market include Ewing (2002), which analyses the interrelationship between five major sectors (i.e., capital goods, financials, industrials, transport and utilities) of the S&P stock indexes, and find that unanticipated shocks in one sector has significant impacts on other sectors. Hassan and Malik (2007) examine the mean and conditional volatility interactions among different United States sector indexes using multivariate GARCH model. They find evidence of shock and volatility transmission among different sectors. Malik and Ewing (2009), employs bivariate GARCH models to simultaneously estimate the conditional variance between five US sectors and oil prices using weekly returns and find evidence of significant transmission of shocks and volatility between oil prices and some of the examined sectors. Similarly, Arouri, Jouini and Nguyen (2011) investigate volatility transmission between oil price and equity returns in Europe and the United States at the sector-level, and find significant evidence of return and volatility spillovers. Their results however show that the spillover is usually unidirectional from oil markets to stock markets in Europe, but bidirectional in the United States.

## Methodology and Data

### *Methodology*

The BEKK representation of multivariate GARCH model outlined in Engle and Kroner (1995) is adopted to investigate volatility transmission between stock and foreign exchange markets in Nigeria. The BEKK model presents a natural way to estimate the interaction within conditional mean and conditional variance of two or more series because of its capability to detect volatility transmission among the series, as well as persistence of volatility within each series.

The first step in the multivariate GARCH methodology is to specify the mean equation. Thus, the mean equation for return series is specified as follows:

$$\begin{aligned} R_t &= \mu_i + \theta R_{i,t-i} + \varepsilon_t \\ \varepsilon_t &= H_t^{1/2} \eta_t \end{aligned} \quad (1)$$

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Where  $R_t = (R_t^B, R_t^{CG}, R_t^{LII})'$  is a vector of returns of the banking, consumer goods, and lotus Islamic sectors respectively,  $\theta$  refers to a 3x3 matrix of coefficients,  $\varepsilon_t = (\varepsilon_t^B, \varepsilon_t^{CG}, \varepsilon_t^{LII})'$  is the vector of error terms of conditional mean equation for banking, consumer goods, and lotus Islamic sectors respectively.  $\eta_t = (\eta_t^B, \eta_t^{CG}, \eta_t^{LII})'$  is a sequence of independently and identically

distributed (i.i.d) random errors;  $H_t = \begin{pmatrix} h_t^B & h_t^{BCG} & h_t^{BLII} \\ h_t^{CG} & h_t^{CGB} & h_t^{CGLII} \\ h_t^{LII} & h_t^{LII} & h_t^{LII} \end{pmatrix}$  is conditional variance-covariance

of the banking, consumer goods and Shari'ah equities sectors' returns.

The next step is to specify the conditional variance-covariance equation. Thus, the BEKK representation of multivariate GARCH (1,1) model is given by:

$$H_t = CC' + A\varepsilon_{t-1}\varepsilon_{t-1}'A' + BH_{t-1}B' \quad (2)$$

Where,  $H_t$  is the conditional variance matrix.  $C$ ,  $A$ , and  $B$  are parameter matrices.  $C$  is a 3x3 lower triangular matrix,  $A$  is 3x3 square matrix that shows how conditional variances correlate with past squared errors, and  $B$  is 3x3 square matrix that measures the effect of past conditional variances on the current conditional variances and the degree of persistence in the volatility of the markets. The parameter matrices can be represented as follows:

$$\begin{bmatrix} h_{b,t} & h_{b,CG,t} & h_{b,LII,t} \\ h_{CG,b,t} & h_{CG,t} & h_{CG,LII,t} \\ h_{LII,b,t} & h_{LII,CG,t} & h_{LII,t} \end{bmatrix} = \begin{bmatrix} c_{b,b} & . & . \\ c_{CG,b} & c_{CG,CG} & . \\ c_{LII,b} & c_{LII,CG} & c_{LII,LII} \end{bmatrix} + \begin{bmatrix} a_{b,b} & a_{b,CG} & a_{b,LII} \\ a_{CG,b} & a_{CG,CG} & a_{CG,LII} \\ a_{LII,b} & a_{LII,CG} & a_{LII,LII} \end{bmatrix} + \begin{bmatrix} b_{b,b} & b_{b,CG} & b_{b,LII} \\ b_{CG,b} & b_{CG,CG} & b_{CG,LII} \\ b_{LII,b} & b_{LII,CG} & b_{LII,LII} \end{bmatrix} + \begin{bmatrix} \varepsilon_b & \varepsilon_{b,CG} & \varepsilon_{b,LII} \\ \varepsilon_{CG,b} & \varepsilon_{CG} & \varepsilon_{CG,LII} \\ \varepsilon_{LII,b} & \varepsilon_{LII,CG} & \varepsilon_{LII} \end{bmatrix} \quad (3)$$

Where  $h_{b,t}$ ,  $h_{CG,t}$  and  $h_{LII,t}$  denote the conditional variance of the banking sector, consumer goods sector, and Shari'ah equities sector respectively;  $h_{b,CG,t}$  and  $h_{b,LII,t}$  the covariance of banking and consumer goods sectors, as well as banking and Shari'ah equities sectors;  $h_{CG,b,t}$  and  $h_{CG,LII,t}$  are the covariance of consumer goods and banking sectors, and consumer goods and Shari'ah equities sectors;  $h_{LII,b,t}$  and  $h_{LII,CG,t}$  are the covariance of Shari'ah compliant equities and banking sectors, and Shari'ah equities and consumer goods sectors of the NSE. The significance of the diagonal coefficients  $a_{bb,t}$  ( $a_{CG,CG,t}$ ) [ $a_{LII,LII,t}$ ] suggests that the current conditional variance of  $h_{bb,t}$  ( ) [ ] is correlated with its own past squared errors, while the significance of the lagged variance  $b_{11,t}$  ( $b_{CG,CG,t}$ ) [ $b_{LII,LII,t}$ ] indicates that the current conditional variance of ( ) [ ] is affected by its own past conditional variance. Similarly, the significance of the off-diagonal coefficients  $a_{b,CG,t}$  &  $b_{b,CG,t}$ , and  $a_{b,LII,t}$  &  $b_{b,LII,t}$  indicate evidence of shock and volatility transmission from the banking sector to the consumer goods and Shari'ah equities sectors; whereas the significance of the off-diagonal coefficients  $a_{CG,b,t}$  &  $b_{CG,b,t}$ , and  $a_{CG,LII,t}$  &  $b_{CG,LII,t}$  show evidence of shock and volatility transmission effects from the consumer goods sector to the banking sector and the Shari'ah equities sector. Similarly, the significance of the

off-diagonal coefficients  $a_{lii,b,t}$  &  $b_{lii,b,t}$ , and  $a_{lii,cg,t}$  &  $b_{lii,cg,t}$  show evidence of shock and volatility transmission effects from the Shari'ah equities sector to the consumer goods sector and the banking sector. The parameter matrices are estimated using the expanded BEKK-MGARCH (1,1) equation:

$$h_{11,t+1} = c_{11}^2 + c_{11}^2 + a_{11}^2 \varepsilon_{1,t}^2 + 2a_{11}a_{12}\varepsilon_{1,t}\varepsilon_{2,t} + 2a_{11}a_{31}\varepsilon_{1,t}\varepsilon_{3,t} + a_{21}^2 \varepsilon_{2,t}^2 + 2a_{21}a_{31}\varepsilon_{2,t}\varepsilon_{3,t} + a_{31}^2 \varepsilon_{3,t}^2 + b_{11}^2 h_{11,t}^2 + 2b_{11}b_{12}h_{12,t} + 2b_{11}b_{31}h_{13,t} + b_{21}^2 h_{22,t}^2 + 2b_{21}b_{31}h_{23,t} + b_{31}^2 h_{33,t}^2 \quad (4)$$

$$h_{22,t+1} = c_{12}^2 + c_{22}^2 + a_{12}^2 \varepsilon_{1,t}^2 + 2a_{12}a_{22}\varepsilon_{1,t}\varepsilon_{2,t} + 2a_{12}a_{32}\varepsilon_{1,t}\varepsilon_{3,t} + a_{22}^2 \varepsilon_{2,t}^2 + 2a_{22}a_{32}\varepsilon_{2,t}\varepsilon_{3,t} + a_{32}^2 \varepsilon_{3,t}^2 + b_{12}^2 h_{11,t}^2 + 2b_{12}b_{22}h_{12,t} + 2b_{12}b_{32}h_{13,t} + b_{22}^2 h_{22,t}^2 + 2b_{22}b_{32}h_{23,t} + b_{32}^2 h_{33,t}^2 \quad (5)$$

$$h_{33,t+1} = c_{13}^2 + c_{33}^2 + a_{13}^2 \varepsilon_{1,t}^2 + 2a_{13}a_{23}\varepsilon_{1,t}\varepsilon_{2,t} + 2a_{13}a_{33}\varepsilon_{1,t}\varepsilon_{3,t} + a_{23}^2 \varepsilon_{2,t}^2 + 2a_{23}a_{33}\varepsilon_{2,t}\varepsilon_{3,t} + a_{33}^2 \varepsilon_{3,t}^2 + b_{13}^2 h_{11,t}^2 + 2b_{13}b_{23}h_{12,t} + 2b_{13}b_{33}h_{13,t} + b_{23}^2 h_{22,t}^2 + 2b_{23}b_{33}h_{23,t} + b_{33}^2 h_{33,t}^2 \quad (6)$$

Equations (4), (5) and (6) show how shocks and volatility are transmitted between the three sectors of the NSE. Statistical significance of the off-diagonal parameters is evidence in support of shock and volatility transmission between the three sectors of the Nigerian economy. The parameters are estimated using the maximum likelihood estimation method optimized with the Broyden, Fletcher, Goldfarb, and Shanno (BFGS) algorithm. The conditional likelihood function  $L(\theta)$  is expressed thus:

$$L(\theta) = -T \ln(2\pi) - \frac{1}{2} \sum_{t=1}^T (\ln |H_t| + \varepsilon_t' H_t^{-1} \varepsilon_t) \quad (4)$$

Where,  $T$  is the number of observations and  $\theta$  is the parameter vector to be estimated.

The robustness of the multivariate GARCH models can be evaluated using a number of diagnostics tests. The Ljung-Box (1978)  $Q$  test statistics are used to examine the null hypothesis of no autocorrelation in the estimated residuals and squared standardized residuals up to a specific lag. Also, Engle's (1982) LM statistic is used to test the null hypothesis of no remaining ARCH effects up to a specific order. In fact, if the multivariate GARCH model is specified correctly, then the estimated standardized residuals should behave like white noise, i.e., they should not display serial correlation, ARCH effect, or any other type of nonlinear dependence (Emenike, 2014).

### Data

The data used in this study comprises the daily NSE banking index to capture the banking sector, the daily NSE consumer goods index to capture the consumer goods sector, and the NSE Lotus Islamic Index to capture Shari'ah compliant equities in the NSE. The NSE Banking Index is designed to provide an investable benchmark to capture the performance of the banking sector, this index comprises the most capitalized and liquid companies in banking sector of the Nigerian economy. The NSE Consumer Index provides an investable benchmark to capture the

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performance of the consumer goods sectors, this index comprises the most capitalized and liquid companies in food, beverage and tobacco. The NSE-Lotus Islamic Index (NSE LII) tracks the performance of 15 Shari'ah compliant equities which have met the eligibility requirements of a renowned Shari'ah Advisory Board. The component stocks are rigorously screened and reviewed bi-annually to ensure their continuous compliance for inclusion. The indexes are based on the market capitalization methodology.

The study period ranges from 04 January 2010 to 30 April 2014, totaling 1071 observations for each index. This time period was chosen because of the availability of data. The NSE started the compilation of other sector indices in January 2009, but the Lotus Islamic Index in January 2010. In addition, the study period corresponds with post global financial crises era. All the indexes were obtained from the NSE and converted into daily returns as follows:

$$R_t = \ln(P_t / P_{t-1}) * 100 \quad (5)$$

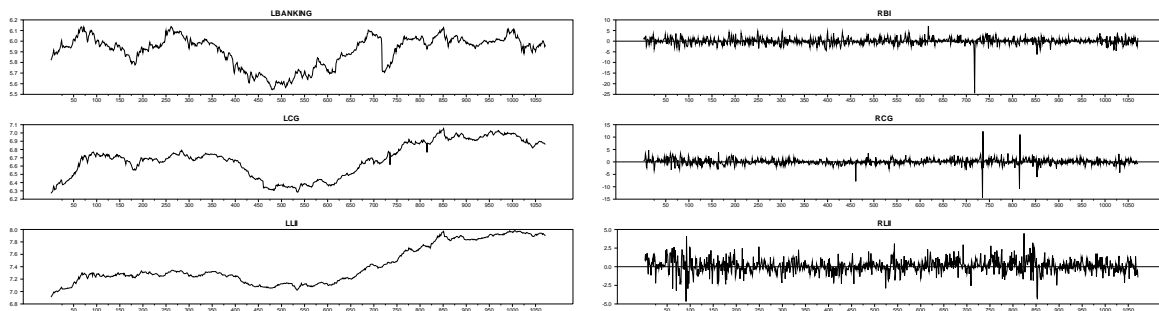
Where,  $R_t$  is daily returns of the sector indexes,  $P_t$  is a vector of closing indexes at time  $t$ ,  $P_{t-1}$  is the previous day closing indexes, and  $\ln$  is natural logarithm.

### Empirical Results and Discussions

#### *Descriptive Statistics*

Figure 1, shows time series plots of level series and daily return series of the NSE banking, consumer goods, and Shari'ah equities sectors indexes for the period ranging from 04 January 2010 to April 30 2014. The level series of all the three indexes show trending behaviour, whereas the return series show mean reversion tendency. Notice, also from *Figure 1*, the downward movement in the level series from November 2011, although with minor fluctuations, the northward movement from beginning of first quarter of 2012. Another visible feature of *Figure 1* is the negative spike in the banking sector and negative and positive spikes in consumer goods and Shari'ah equities sectors return series. In all, while trending series suggest that the underlying series are non-stationary; mean reverting series may indicate that the underlying series are stationarity.

**FIGURE 1: Time Plot of Level Series and Returns of the NSE Banking, Consumer Goods, Islamic Indexes**  
4 January 2010 to 30 April 2014



Descriptive statistics and ARCH-LM estimates are presented in *Table 1* below. As this table shows, annualized mean returns are 3.36%, 13.70% and 22.88% for the NSE banking, consumer goods, and Shari'ah equities indexes respectively. The annualized volatility of the returns are 20.01%, 17.98%, and 15.33% for the NSE banking index, consumer goods index, and Shari'ah equities index respectively. These suggest that the banking sector has the lowest return and standard deviation, whereas the Shari'ah compliant equities sector has the highest return and lowest standard deviation for the study period. The skewness of a normal distribution is zero (0). But the return series of all the three sectors are negatively skewed, with the banking sector exhibiting most negative skewness (-3.20). The negative skewness suggests that there are more negative observations in the three sectors than in standard normal distribution. The excess kurtosis of a normal distribution is zero (0). But the excess kurtosis for the three sectors indicates that they are all more peaked than the normal distribution. In addition, the Jarque-Bera test coefficients for the three sectors are significant at conventional levels, showing that all the series are not normally distributed. Notice also from *Table 1* that ARCH-LM results reject the null hypotheses of no ARCH effect in all the series at the 1% significance level. Thus provides support for ARCH/GARCH model.

Table 1: Descriptive Statistics and Test for ARCH Effect

	Mean	S.D	Skew.	E.Kurt	JB Stat	LM (20)
Banking	0.013	1.608	-3.201 (0.00)	49.929 (0.00)	112972.4 (0.00)	132.42 (0.00)
CG	0.055	1.298	-0.687 (0.00)	32.387 (0.00)	46850 (0.00)	282.55 (0.00)
LII	0.091	0.943	-0.081 (0.27)	2.523 (0.00)	285.09 (0.00)	139.57 (0.00)

**Note:** *P*-values are displayed as (.). The ARCH LM tests are conducted under null hypothesis of no ARCH effect and at 95% confidence level using squared returns.

### *Unit Root Test Results*

Table 2 shows the results of the augmented Dickey-Fuller (ADF) unit root test. The null hypothesis of the ADF test is that a time series contains a unit root. As shown in *Table 2*, the calculated values of the ADF test statistics indicate that the level series contain unit root at the 1% significance level, implying that the level series of three sector indexes under study are non-stationary. However, in the case of the return series, the ADF statistics reject the null hypotheses of unit root at the 1% significance level, implying that the returns series of the NSE banking index, consumer goods index, and Shari'ah equities index are stationary at first difference.

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Table 2: Augmented Dickey-Fuller Unit Root Test Results

Variables:	Level		First Difference	
	5% critical value	computed	5% critical value	computed
Banking	-3.4164	-2.1269	-3.4164	-19.2759**
CG	-3.4163	-1.5093	-3.4164	-22.2581**
LII	-3.4163	-0.9794	-3.4164	-27.6896**

Note: ADF lag length is selected using Akaike information criterion (AIC). \*\* indicates significant at 99% confidence level.

## Multivariate GARCH (1,1)-BEKK Model Results

Table 3 presents the results of the multivariate GARCH(1.1)-BEKK model adopted to examine the nature of volatility transmission between the banking sector, consumer goods sector, and Shari'ah equities sector of the Nigerian economy. Notice from *Table 3* that the coefficients of the diagonal parameters,  $A_{b,b}$ ,  $A_{cg,cg}$ ,  $A_{lii,lii}$ ,  $B_{b,b}$ ,  $B_{cg,cg}$ , and  $B_{lii,lii}$  are all statistically significant at 99% confidence level. These indicate that the null hypotheses of no ARCH and no GARCH effects in the banking, consumer goods, and Shari'ah equities sectors are not true. They also suggests that strong ARCH and GARCH (1.1) process drive the shocks and conditional variances of the sectors' returns. In other words, own past shock and volatility affect the current shock and volatility of the banking, consumer goods, and Shari'ah compliant equities sectors in Nigeria. This finding agrees with Worthington and Higgs (2004) who show evidence of own stock market spillovers being generally higher than cross-volatility spillovers for all markets they examined.

The off-diagonal elements of matrices  $A$  and  $B$  capture cross-sector shock and volatility transmission between the banking sector, consumer goods sector, and Shari'ah equities sector. From the off-diagonal elements of matrix  $A$ , notice that shock from the banking sector spillover to the consumer goods sector and Shari'ah equities sector at 1% significance level, but there no shock transmission from consumer goods and Shari'ah compliant equities sector to the banking sector. This suggests that information flow from the banking sector impact the consumer goods and Shari'ah compliant equities sectors but not the other way round. Notice also that while shocks from the consumer goods sector transmits to the Shari'ah compliant equities sector at 10% significance level, shocks from the Shari'ah compliant equities sector transmits to the consumer goods sector at 1% significance. This implies bidirectional shock transmission between consumer goods and Shari'ah compliant equities sectors within the conventional confidence band. This result agrees with Ewing (2002) finding that shocks in one sector has significant impacts on other sectors using the S&P stock indexes. Evidence of unidirectional shock transmission between banking to consumer goods sector and Shari'ah compliant equities sector is not unexpected given the position of the banking sector in the NSE. SEC (2010), in Emenike and Ani (2014), reports that of the twenty most actively traded equities, banks are the first five. Similarly, of the twenty most capitalised companies on the NSE, eleven are banks. In the same vein, Alawiye (2013), in Emenike and Ani (2014), reports that the banking sector accounted for 57.98 per cent of total trades in the NSE in February 2013. It thus appear that the banking sector lead the information flow in the NSE.

The results of the off-diagonal elements of matrix  $B$  show evidence of volatility transmission from the banking sector to the consumer goods sector and Shari'ah compliant equities sector, with negative and statistically significant coefficients at 99% confidence level,

but not the other way round. This finding suggests that the volatility of the banking sector negatively affects other sector of the NSE. Notice also, from *Table 3*, that while volatility transmits positively from the consumer goods sector to the Shari'ah equities sector, it transmits negatively from the Shari'ah equities sector to the consumer goods sector, all at 1% significance level. These results suggest that there exist evidence of unidirectional shock and volatility transmission from the banking sector to the consumer goods and the Shari'ah equities sectors, whereas bidirectional shock and volatility transmission exist between the consumer goods and the Shari'ah equities sectors at conventional confidence levels. Bidirectional shock and volatility transmission is in agreement with Hassan and Malik (2007), who show evidence of significant shock and volatility transmission among different United States sector indexes.

The existence of unidirectional shock and volatility transmission from the banking sector to the other sectors may not be far from the dominance of the banking sector in the NSE, whereas the bidirectional shock and volatility transmission between the consumer goods and the Shari'ah compliant equities sectors may partly result from advancement in information and communication technology (ICT) which has made it easier for information to flow between the sectors. In addition, the banking sector is under stringent regulatory purview of the Central Bank of Nigeria given its importance to the stability of the Nigerian economy, whereas consumer goods and the Shari'ah equities sectors have more relaxed regulation and governance.

The panel *B* of *Table 3* presents the results of diagnostic tests conducted to ascertain robustness of the estimated model. Notice from panel *B*, that the Ljung-Box Q-statistic for both the residuals and squared residuals of banking, consumer goods and Shari'ah compliant equities sectors are not significant, suggesting that there is no correlation in their residuals. Similarly, the multivariate ARCH-LM and Ljung-Box results show evidence in support of the null hypotheses of no ARCH effect and no serial correlation at 99% confidence level. As a result, there seem to be no specification error in the model.

Table 3: Results of the GARCH-BEKK Model

Parameters	Coefficient	<i>t</i> -statistic	<i>P</i> -value
$C_{(b,b)}$	0.9463	14.5895	0.0000
$C_{(cg,b)}$	0.2560	5.0335	0.0000
$C_{(cg,cg)}$	0.2193	4.4973	0.0000
$C_{(lii,b)}$	0.1750	3.4698	0.0005
$C_{(lii,cg)}$	0.1879	4.8214	0.0000
$C_{(lii,lii)}$	0.0000	8.82854e	0.9999
$A_{(b,b)}$	0.5521	15.668	0.0000
$A_{(b,cg)}$	0.0614	3.1934	0.0014
$A_{(b,lii)}$	0.0391	2.6380	0.0083
$A_{(cg,b)}$	0.0219	0.7987	0.4244

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Parameters	Coefficient	<i>t</i> -statistic	<i>P</i> -value
$A_{(cg,cg)}$	0.2646	8.0418	0.0000
$A_{(cg,lii)}$	-0.0262	-1.6864	0.0917
$A_{(lii,b)}$	-0.0333	-0.6245	0.5322
$A_{(lii,cg)}$	0.1148	2.6095	0.0090
$A_{(lii,lii)}$	0.3169	11.0862	0.0000
$B_{(b,b)}$	0.5112	7.6578	0.0000
$B_{(b,cg)}$	-0.1549	-4.7319	0.0000
$B_{(b,lii)}$	-0.1497	-6.6572	0.0000
$B_{(cg,b)}$	0.0126	0.3080	0.7580
$B_{(cg,cg)}$	0.9960	44.255	0.0000
$B_{(cg,lii)}$	0.0863	5.1628	0.0000
$B_{(lii,b)}$	0.0732	1.2307	0.2184
$B_{(lii,cg)}$	-0.1792	-6.8425	0.0000
$B_{(lii,lii)}$	0.8843	43.6448	0.0000

## Panel B: Diagnostic Tests

	Statistic	Signif. Lvl.
$Q_b(65)$	77.284	0.1414
$Q_b^2(65)$	72.580	0.2424
$Q_{cg}(65)$	72.967	0.2326
$Q_{cg}^2(65)$	24.673	0.9999
$Q_{lii}(65)$	92.071	0.0152
$Q_{lii}^2(65)$	69.342	0.3332
MV LM (65)	1.01	1.0000
MV Q (65)	71.23	0.2782

**Note:**  $Q_b$ ,  $Q_{cg}$  and  $Q_{lii}$  are the Ljung-Box Q-statistic for the banking, consumer good, and Shari'ah equities sectors respectively. MV LM and Q are multivariate ARCH-LM and Ljung-Box Q-statistic for null hypotheses of no ARCH effect and no autocorrelation in multivariate GARCH model. Lag length is displayed as (.). All the tests are conducted at 1% significant levels.

## Conclusions

Volatility transmission between the banking sector, consumer goods sector and Shari'ah compliant equities sector of the Nigerian Stock Exchange are of particular interest to academics, investors (institutional and individual), and financial market regulators due to the importance of the sectors to orderly price discovery, adoption of optimal hedging strategy and portfolio risk management. As a result, this study evaluates the nature of volatility transmission between banking sector, consumer goods sector and Shari'ah equities sector of the NSE for the period ranging from 04 January 2010 to 30 April 2014 using multivariate GARCH (1.1)-BEKK model. The results of the multivariate GARCH (1.1)-BEKK model indicate that own past shock and volatility affect the current shock and volatility of the banking, consumer goods, and Shari'ah compliant equities sectors in Nigeria. The results also show that shock from the banking sector transmits to the consumer goods sector and Shari'ah equities sector but not from consumer goods and Shari'ah equities sector to the banking sector. However, there is bidirectional shock transmission between the consumer goods and the Shari'ah compliant equities sector within the band of conventional significance levels. The results further show evidence of volatility transmission from the banking sector to the consumer goods sector and Shari'ah equities sector, with negative and statistically significant coefficients but not the other way round. On the other hand, volatility transmits positively from the consumer goods sector transmits to the Shari'ah compliant equities sector, whereas it transmits negatively from the Shari'ah equities sector to the consumer goods sector. In summary, the results indicate existence of unidirectional shock and volatility transmission from the banking sector to the consumer goods and the Shari'ah equities sectors, and bidirectional shock and volatility transmission between the consumer goods and the Shari'ah equities sectors of the NSE. The implication is for domestic portfolio management through hedging and risk management opportunities inherent in the NSE sectors, as well as common information sharing between regulators of different industries that comprise the NSE sectors.

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# THE ROLE OF RISK PERCEPTION IN THE SYSTEMIC RISK GENERATION AND AMPLIFICATION: AGENT-BASED APPROACH\*

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**Abstract:** *In the paper we study how systemic risk, and in result stability of financial system, depends on the market participants' perception of risk and perception of risk attitudes of the remaining market participants. In our analysis we use both the general equilibrium approach and the complex systems approach to economic dynamics. Namely, we use insights from the social amplification of risk framework to build an agent-based model of financial system. The perception of risk has been widely studied, using both qualitative and quantitative methods, in psychology, sociology, communications theory, behavioral economics and finance. However, addressing the central problem in managing and mitigating systemic risk requires not only understanding of how and why people and institutions perceive risk but also how their perception of risk attitudes of the other market participants affects the distribution of risks in the financial system. We model dependence of the financial market risk distribution on the agents' perception of risk. We show that the perception of risk attitudes increases the vulnerability of the financial system to external shocks. Furthermore, the perception of risk attitudes can fasten the self-organization of the system and lead to emergence of new kinds of risks that would generate the systemic effects. As a result, the notion of systemic risk endogeneity seems to be redefined.*

**Keywords:** *systemic risk, non-equilibrium theory, complex systems, self-organized criticality, behavioral finance, social amplification of risk framework*

**JEL Classification:** *C6; F3; G1;G2;*

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## Introduction

The perception of risk has been widely studied, using both qualitative and quantitative methods, in psychology (Gregory and Mendelsohn, (1993)), sociology (Wildavsky, Aaron and Dake (1990)), communications theory (Kasperson and Kasperson, (2005)), behavioral economics and finance (Tversky and Kahneman (1974)). Notwithstanding, remarkable little attention has been devoted in the literature to define the role of risk and uncertainty perception in the generation and amplification of systemic risk. However, addressing the central problem in managing and mitigating systemic risk requires not only understanding of how and why people and institutions perceive and estimate risk but also how their perception of risk attitudes of the remaining market participants affects the distribution of risks in the financial system.

We show that in accordance with the ‘core approach’ (Caballero (2010)) the perception of risk attitudes increases the vulnerability of the financial system to external shocks. Nonetheless, it does not allow us to explain the endogenous nature of systemic risk. To extend our understanding of systemic risk we applied ‘periphery approaches’ (Caballero (2010)) that allowed us to notice that in fact the perception of risk attitudes can fasten the self-organization of the system and lead to emergence of new kinds of risks that would generate the systemic effects. In that sense, the perception of risk and risk attitudes redefines the concept of systemic risk endogeneity. As a result, the effectiveness of financial regulation and macroprudential tools changes and it has a direct implications for policy-making (Hanson, Kashyap and Stein (2011)).

### *The endogenous nature of systemic risk*

There is no commonly accepted definition of systemic risk at present. Hartmann (Financial Stability Review - ECB (2009)) points out that disputes concerning how to define systemic risk are directly related to the perception of its nature. In fact, there are two ways of approaching systemic risk. According to the first one, risk is related to the existence of external shocks (idiosyncratic or systematic) that trigger systemic effects. Alternatively, the event can emerge endogenously ‘from within’ the financial system or ‘from within the economy at large’ (Jakimowicz (2010)). The effects can be both types sequential or simultaneous. Moreover, we can distinguish between a ‘horizontal’ perspective of systemic risk and a ‘vertical’ one. The first one pays attention only to the financial sector.-The second one includes feedback effects with the real economy. Most of theoretical and empirical studies on systemic risk published before the crisis emergence adopted a horizontal perspective. As a result, the modeling process has been significantly simplified, but the cost of simplification was rather high. The omission of important feedback effects and amplification mechanisms led to extraction of incomplete or incorrect conclusions (Hanson, Kashyap and Stein (2011), Korinek (2011)), which were then used for purpose of policy-making. Parting from the endogenous nature of systemic risk it is advisable to distinguish between:

- ‘*endogenous systemic risk generators*’ – factors that generate systemic risks ‘from within the system’ and initiate the non-equilibrium intrinsic dynamics e.g. leverage and liquidity mismatches (Brunnermeier, Krishnamurthy and Gorton (2013)) or interconnectedness and interconnectivity (Drehmann and Tarashev (2011));
- ‘*amplifiers*’ and ‘*amplification mechanisms*’ – factors, mechanisms and channels that spread the adverse effects of external shocks to financial stability, mostly related to market failures (Korinek (2011)).

In fact, both groups of factors and mechanisms have played different roles in the origin, course and effects of the financial crisis. The quantification of their relative roles is relevant from the theoretical point of view as well as it would be useful in the ‘governance and regulatory practice’ (Schwarch (2011)).

#### *New measurement and modeling techniques*

Before the crisis, most public organizations have been using dynamic stochastic general equilibrium [DSGE] models. The broad consensus on how to construct econometric forecasting models existed despite of the knowledge of deficiencies of DSGE approach in financial sector modeling (Caballero (2010)). None of the models have been used to explain the systemic risks generation ‘from within the system’ or to describe amplification mechanisms nor were they useful in assessing potential effects of credit crunches. Since then, many alternative approaches have been developed as an alternative to the ‘core approach’ (Caballero (2010)): inter alia new studies in behavioral economics, econophysics (Abergel, Chakrabarti, Chakraborti and Ghosh (2013), Krapivsky, Redner and Ben-Naim (2010)), social network modeling (Armini and Minca (2013), Bak and Paczuski (1995)), agent-based modeling and simulations [ABMS] (Castellano, Fortunato and Loreto (2007), MacKay (2013), Thurner (2011)). Many of these models suffer from a relative lack of connection to the ‘real world’ societal behavior (Castellano, Fortunato and Loreto (2007), Sobkowicz (2009)). Moreover, not all of them are equally interesting from the perspective of systemic risk and perception of risk research. Among the most promising ones are: opinion and consensus models (Deffuant, Amblard, Weisbuch and Faure (2002), Deffuant, Neau, Amblard and Weisbuch (2000), Galam (2008)), models of homophily (Bala and Goyal (2000)), models of perception of similarity and popularity (Javarone and Armano (2013)), models of epidemics (MacKay (2013)), and contagion (Dodds and Watts (2005)). Even though the methodologies used in the aforementioned papers have not been directly applied to finance, they provide important insights which can be used in further empirical research. We show that on the example of the modeling procedure of perception of similarity adopted by Javarone and Armano (2013).

The authors analyze how basic properties of social networks appear to be deeply influenced by the individual perception of people. They map behaviors by considering similarity and popularity and ‘interpretations of similarity’. Considering that, we could assume that non-human agents, e.g. financial institutions, in risky situations are usually acting similarly to the other market participants. While in fact, their actions are rather based on their perception or interpretation of what other participants would do in a given situation. The ‘core approach’ provides an explanation of that fact in terms of asymmetric and/or incomplete information. Unfortunately, besides the game theory insights, little has been told on how to model such behavior; few existing general equilibrium contributions can be found in Barnhill and Schumacher (2011). In Javarone and Armano (2013), from a computational perspective similarity is calculated as a distance measure on top of a hyperbolic space. The simulations performed by the authors allowed them to analyze the relevant properties of community structures in the networks.

Another useful approach is the agent-based modeling and simulation [ABMS]. The ABMS approach allows for modeling the dynamics of complex systems and complex adaptive systems. The agent-based models are closely related to ‘theories of non-equilibrium behavior’. Additionally, in macrofinance, these kinds of models represent the group of ‘instability models of financial system’. The basic idea behind the complex systems approach is that “large dynamical systems naturally evolve, or self-organize, into highly interactive,

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critical state where a minor perturbation may lead to events, called avalanches, of all sizes” (Bak and Paczuski (1995)). The term “self-organized criticality” [SOC] was introduced to describe the dynamics of many-body systems that appear to reach critical state without fine-tuning their parameters (Janes (1998), MacKay (2013)). In reference to the macro finance modeling, the self-organized criticality refers to financial sector default or credit crunch that may occur spontaneously as a consequence of the system achieving a critical state. The crucial element is that system achieves it through its own intrinsic dynamic and critical nature (MacKay (2013)). The mathematical derivation of models presenting the self-organized criticality is included in Janes (1998) and in MacKay (2013).

The agent-based approach is useful in modeling specific human and non human behaviors as well as their interactions. In the ABMS approach, agents’ behaviors are described by simple rules, and interactions with other agents, which in turn influence their behaviors. “Patterns, structures, and behaviors emerge that were not explicitly programmed into the models, but arise through the agent interactions” (Macal and North (2010)). The most important defining characteristics of agents are their heterogeneity and capability to act autonomously, in response to new situations and actions of other agents in the neighborhood (in that sense, only local information is available to agents). The number of agent can change as simulation proceeds. Each agent has a state that represent the essential variables associated with its current situation and that varies over time. An agent’s behaviors are conditioned on its state (Macal and North (2010)). The agent-based model’s topology represents how agents are connected; typically it is a spatial grid or a network.

The most complete agent-based model of the EU economy is EURACE (Deissenberg, van der Hoog, Dawid (2008)). Although this model included the financial sector in the analysis, it has never been used in the context of systemic risk monitoring or as a management and mitigation tool. In fact, the problem of systemic risk generation and amplification is understudied, especially in the complex systems context. For exceptions and interesting contributions to the topic see: Thurner (2011), Klimek, Poledna, Farmer and Thurner (2014).

### *Perception of risk and risk attitudes in systemic risk research*

Among many relevant findings in the area of ‘perception of risk’, the social amplification of risk framework [SARF] (Kasperson et al. (1988), (2005)) appears to be the most useful in the systemic risk research. Perception of risk ‘per se’ could be treated rather as the ‘systemic risk generator’ than ‘amplificator’. However we do not want to narrow our analysis only to the ‘generators’, therefore we will also consider spreading risks across financial system.

In fact, spreading of risk across the system is related not only to the perception of risk but also to the perception of risk attitudes of the other market participants. It is mostly based on *making opinions* and *beliefs* about what the others’ perception of risk is. In that sense, we are no longer only in the physical world of deterministic and/or stochastic rules. It is a creation of *interpretations* of risks and risk attitudes that plays a crucial role in the amplification mechanisms of financial system. For that reason, the social amplification of risk framework is so useful. According to the SARF, “the theoretical starting-point is the assumption that ‘risk events’ (...) will be largely irrelevant or localized in their impact unless human being observe and communicate them others (Luhmann, 1979). (...) SARF holds that, a key part of that communication process, risk, risk events and characteristics of both become portrayed through various risk signals, which in turn interact with a wide range of psychological, social, institutional, or cultural processes in ways that intensify or attenuate perceptions of risk and its manageability. The experience of risk therefore is not only an experience of *physical* harm but result of processes by which groups or individuals learn to acquire or create interpretations of risk (Kasperson et al. (1988))”. As the authors continue, “these

interpretations provide rules of how to select, order, and explain signals emanating from the physical world (Renn, Burns, Kasperson et al., 1992) (...). With this framework, risk experience can be properly assessed only through the interaction among the physical harms attached to risk event and the social and cultural processes that shape interactions of that events, secondary and tertiary consequences that emerge, and the actions taken by managers and publics (Kasperson et al. (1988)).”

### *Risk and uncertainty*

Finally, we seek to identify and quantify the role of risk perception and perception of risk attitudes in systemic risk generation and amplification. However, what risk actually is? Is an interpretation of risky or uncertain event a ‘true risk’ to financial stability? In many cases, it is rather a perception of attitudes and interpretation of event that trigger systemic effects. In that sense, from the regulatory and prudential policies perspective, it is not always useful to simply identify events as risks or uncertainties on a basis of potential quantification in probabilistic terms. On the other hand, to quantify systemic risk it is also necessary to analyze how much uncertainty there is in the amplification mechanisms related to perception of risk and risk attitudes. New modeling techniques could help us to understand how systemic risk is generated and amplified, but can we quantify the whole processes? A negative response to this question would put in doubt the effectiveness of ‘early-warning systems’. Further research on this topic is urgently needed.

The aim of this paper is to analyze the role of perception of risk and risk attitudes in the systemic risk generation and amplification using the agent-based techniques. Our simplified model is only a small ‘building-block’ of a greater model developed as a part of the research project funded by the National Science Centre [NCN]. It is not aimed to compete with ‘the core’ econometric forecasting and explanatory models. It is rather expected to provide a number of new insights that cannot be obtained using traditional tools, focusing on ‘emergence’ and ‘self-organized criticality’. In mathematical terms, we focus on the changes in the probabilistic distributions of risks in the system.

The remainder of the paper is organized as follows. In section 2, we review the analysis of perception of risks in the market performed by the Bank of England. Next, we outline the construction of some of our variables and develop our empirical model. In section 3, we present the main results and compare them to the GE models’ results. Section 4 concludes.

## **Empirical study on risk perception and attitudes**

### *Evaluation of risk perception by Bank of England*

The importance of analysis of risk perception in the systemic risk generation and amplification has already been noticed by the main central banks in the world. In July 2008, Bank of England introduced a formal ‘Systemic Risk Survey’ to “supplement its regular dialogue with market participants” and “to elicit market participants’ views about the prospects for financial stability in the United Kingdom” (Financial Stability Report - BoE (2014)). The objectives of research were “to ensure that the Bank is not missing risks that are of concern to survey respondents” and “to highlight risks that the Bank considers to be important but are not cited by market participants” (Financial Stability Report - BoE (2014)). This survey was a first (at least first published) attempt to quantify the perception of risks in the market, at least since the emergence of the crisis.

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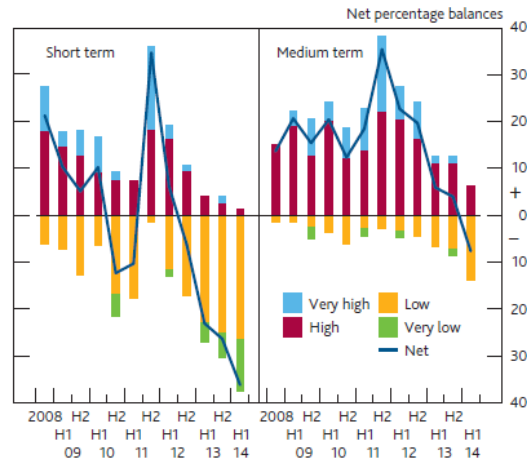


Figure 1: Perceived probability of a high-impact event in the UK financial system (Net percentage balances). (Source: Financial Stability Report, BoE, 06.2014).

It provides us many interesting conclusions about the main trends in the economy and financial markets. It is worth noticing that a peak of the perceived probability of high-impact event in the UK financial system was observed in 2011 as depicted in the [Fig.1]. Even if we assume that the United Kingdom economy could have been affected by the main financial shock with some delay with respect to other European countries (this statement may also generate some controversies, but assuming so), we clearly see that it was a *perception* of risk that played a special role in the amplification of shock from 2008. The same logic would apply to systemic risk ‘generators’ and ‘amplifiers’.

The main weakness of the methodology used by the Bank of England was that it was aimed to quantify the role of risk perception in ensuring financial stability, but it left unexplored (at least in the published form) the role of perception of *risk attitudes* in the systemic risk generation and amplification. One of the procedures that allows to capture how the market participants’ behaviors and risk attitudes change is to analyze the differences between answers in the survey and so-called ‘market measures of risk perception’ results. What market participants indicate in the survey as a potential risk could be called an ‘*interpretation*’ or ‘*social construction of event*’ in the language of the social amplification of risk framework. The market measures provide real data on the result of ‘*interactions between different agents’ perceptions of risks*’. We show that on the simplest example of liquidity on the interbank lending market. Although disaggregated data on risk perceptions did not indicate the lack of liquidity in the interbank lending market to be a main threat to financial stability, the market has frozen due to asymmetric information and liquidity hoarding. We return to this topic in the context of the publication of Alfonso, Kovner, Schoar (2011) and the comparison of market-based measures of risk perception and its modeling in terms of behavioral rules in the agent-based approach. It is crucial to compare market measures with the results of surveys carried out by the central banks (including the Bank of England). Additionally, such comparison should be supported by the inclusion of new modeling and quantification techniques of risk perception and perception of risk attitudes. In next subsection we present a tool that could help us to achieve such goal.

*The role of risk perception and attitudes in systemic risk*

Objectives, Methodology & Scenarios

We model dependence of the financial market risk distribution on the agents' perception of risk. To achieve this aim, we develop an agent based model of financial system with insights from the social amplification of risk framework. Then in '*Conclusions and Further research*', we compare results to ones obtained using the general equilibrium techniques (Barnhill and Schumacher (2011), Brunnermeier and Krishnamurthy (2014), Brunnermeier and Oehmke (2012)) and to empirical research conducted by Alfonso, Kovner and Schoar (2011) for U.S. interbank lending market. As previously mentioned, we show that the perception of risk attitudes increases the vulnerability of the financial system to external shocks (macroeconomic or financial external shocks). Furthermore, the perception of risk attitudes can fasten the self-organization of the system and lead to emergence of new kinds of risks that would generate the systemic effects. We focus on feedback effects and amplification mechanisms originating from different perception of risk attitudes. In this context, we analyze effectiveness of financial regulation and prudential policies in the systemic risk mitigation.

*Scenario 0: Baseline*

In the baseline scenario, we assume the state and characteristics of the Spanish economy and financial sector in 2007, before the emergence of the crisis (Economic Bulletin and Database of BdE (2007), (2014)). After a remarkable performance in terms of growth, employment and public finances over more than a decade in Spain, these favorable developments have been tempered by deterioration in several areas (OECD Economic Survey of Spain (2007)). First of all, the persistent high inflation differential harmed competitiveness. Secondly, there was an excessive domestic demand as a result of low real interest rates. Moreover, the external deficit remained unbalanced during years. The resilience of financial system was emphasized in the Financial Stability Report published by the Bank of Spain (2007). The main macroeconomic and financial indicators and values of variables were based on the Bank of Spain data. Then, as the simulation proceeds the values change according to the behavioral rules described below (see: *Behavioral rules*).

*Scenario 1: Change in the official interest rate level ( $\Delta$ OIR)*

In the first scenario, we modify the official interest rate level. Evidence abounds that in the decade leading up to the 2008, banks expanded their loan portfolios. An inverse relation between the interest rate level and the expansion of loans seems to be a stylized fact, but it is not the only one effect. The low interest rate is also likely to be an important determinant of risky behavior (Dell, Laeven and Marquez (2014), Jimenéz, Ongena, Peydró and Saurina (2008)). Moreover, the 'sensibility of risky behavior' to changes in interest rate is not always the same. The empirical studies show that in period before the crisis the low interest rate determined the risky behavior while that risky behavior changes only gradually after the interest rate finally started to grow. Other studies emphasize that this conclusion does not apply to the period after the crisis emergence. In our model, the interest rate level determines the interbank lending behavior of financial institutions. We include the relations between the official interest rate and reference interest rates as well as interest rates charged for interbank lending and depositing of funds in the central bank. Although we assume in the model the behavioral measure of risk perception, we also analyzed the systemic risk measure that is based on the differential of the reference interest rate and official interest rate. In that terms,

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changes in interest rates have a direct impact on how the systemic risk perception was measured as well.

*Scenario 2:* Change in the interest rate ( $\Delta\text{OIR}$ ) & loans to banks that need to cover the reserve requirements ( $\Delta\text{IBP}$ )

In the second scenario, we allow not only for modification of official interest rate, but we also take into account the possibility of obtaining a loan to cover the reserve requirements. In this scenario, the same logic as in the first one applies, but the counterfactual simulation of interest rate variations is supplemented by the analysis of changes in the interbank position. In this case, banks are not limited to exchanging funds in the interbank lending market or to depositing them in the central bank, but they are also allowed to obtain additional funds from the regulator. The aim of such policy is to ensure the adequate level of liquidity in the market and to reduce the risk of bankruptcy that could trigger the systemic risk effects. In our model, we assume that the *perception* of financial institution being on the edge of bankruptcy increases the systemic risk. The empirical studies show that loans to banks to cover the reserve requirements can reduce such perception and increase the liquidity in the market. At least in the theory, it should not have the same effect as the public ‘back-up’ or nationalization as it should not generate a moral hazard problem.

*Scenario 3:* Change in the interest rate ( $\Delta\text{OIR}$ ) & increase in reserve requirements ( $\Delta\text{RR}$ )

In the third scenario, we analyze consequences of changes in the official interest rate and in the reserve requirements level. The logic of the first scenario applies, but additionally we study the effect of changes in reserves requirements. Reserve requirement sets the minimum fraction of customer deposits that each lending financial institution must hold as reserves. It is used as a supplementary tool in monetary policy. It changes the amount of funds available for banks to make loans. As the main ‘building-block’ of our model is the interbank-lending market it is necessary to study how the increase in reserve requirements changes behaviors of banks and what are the most common response to such policy in normal and stressed conditions in the market.

### Structure of agent-based model

The model includes artificial financial system that allows us to study basic characteristics of financial markets. We model decisions taken by financial institutions in the financial market, taking into account their own characteristics (e.g. systemic risk perception, short-term and long-term deposits and loans, default rate) as well as external market conditions (e.g. interest rate, GDP growth or unemployment rate) and regulatory requirements (e.g. reserve requirements, changes in the official interest rate). Our model is a part of a bigger framework developed as a part of the research project funded by the National Science Centre [NCN]. In the project we develop a simulation for two economies: Spain and the United Kingdom in order to compare potential effects of the membership in the Euro Area and to assess the effectiveness of financial regulation and macro prudential tools in both cases. One of the most important ‘building blocks’ of the model is the simulation of interbank lending market. That part of the model includes the insights of simple model presented in the paper that is aimed to emphasize and quantify the role of risk perception and perception of risk attitudes in systemic risk generation and amplification.

## Time and space

We use our approach to model in a simplified and stylized way, the Spanish financial sector (as an example of the EU financial system and a member of the Euro Area) including also the most important feedback effect with the real economy. To that end, we used economic data available from the Bank of Spain (Central bank of Spain) and Eurostat (the statistical office of the European Union). The temporal resolution of the model is a month. The activities undertaken by the agents take place at most on a month basis. Inflation was included in the model by using real interest rates.

## Agents, variables, coefficients, parameters

In the model, agents are primarily financial institutions characterized by the following state (as a set of variables):

Table 1: Variables of the module of agent-based model. (Source: Own elaboration, 2014).

Variables	LTD	long-term deposits	
	STD	short-term deposits	
	LTL[HQ],[LQ]	long-term loans	Default rate for LTL[LQ]: it depends on unemployment rate.
	STL	short-term loans	
	RR	reserve requirement	RR sets the minimum fraction of customer deposits (SRD) that each commercial bank must hold as reserves; a bank can fix higher level than the obligatory one
	IBP	interbank position	In case of inability to cover the reserve requirements, a bank can borrow money paying interest rate (EONIA). Positive values indicate a lending position.
	Profits	profits in the last month	Profits are distributed among shareholders and they are derived from business activity of institution
	r(LTD)	long- term deposits interest rate	Interest rates: banks charge it to long-term loans and short-term loans; and they offer interest rate $r(X)$ to long-term deposits and short-term deposits .  $r(X)$ – interest rate, where X is a type of loan or deposit (4 variables).
	r(STD)	short-term deposits interest rate	
	r(LTL)	long-term loans interest rate	
	r(STL)	short-term loans interest rate	
	SRP	systemic risk perception	It is the probability that an institution gives to at least one financial institution to bankrupt in the following month. There are other possible procedures of introducing SRP measure (see: commentary below).

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Table 2: Parameters of the module of the agent-based model (Source: Own elaboration, 2014).

Parameters	RIR	reference interest rate	RIR: at the beginning constant and equal to 0.01. We then model how RIR changes according to financial risk (second stage modeling in the NCN model).
	OIR	official interest rate	Official interest rate (OIR): it increases (decreases) when the long-term loans increase (decrease) more than GDP. Lower bound is equal to 0.  $OIR = \max[0; OIR_t - \rho_{OIR} \frac{(GDP_t - GDP_{t-1})}{GDP_{t-1}} - \frac{((LTLQL_t + LTHQL_t) - (LTLQL_{t-1} + LTHQL_{t-1}))}{(LTLQL_{t-1} + LTHQL_{t-1})}]$
	Exp GDP_gr	expected GDP growth	
	Act GDP_gr	actual GDP growth	
	Unemp_rate	unemployment rate	It changes according to the Okun ley.
	HPI	house price index	$HPI = \alpha_{real\_estate} \cdot GDP$
	Default rate	default rate of loans	
	ar(LTD)	average interest rate LTD	
	ar(STD)	average interest rate STD	
	ar(LTL)	average interest rate LTL	
	ar(STL)	average interest rate STL	

Table 3: Coefficients of the module of agent-based model (Source: Own elaboration, 2014).

Coefficients	Avg_dur_LTL	average duration LTL	We compute the average.
	Avg_dur_STL	average duration STL	We compute the average.
	Avg_dur_STD	average duration STD	We compute the average.
	Avg_dur_LTD	average duration LTD	We compute the average.
	$\alpha_{real\_estate}$	relation between GDP and house price	
	$\alpha_{LTD}$	relation between GDP and LTD	
	$\alpha_{STD}$	relation between GDP and STD	
	$\alpha_{STL}$	relation between GDP and STL	
	$\alpha_{LTL}$	relation between GDP and LTL	

	$\beta_{R(STL)}$	effect of high interest rates on STL	
	$\beta_{R(LTL)}$	effect of high interest rates on LTL	
	$\rho_{R(LTD)}$	sensitivity of price competition on LTD	
	$\rho_{R(STD)}$	sensitivity of price competition on STD	
	$\rho_{R(STL)}$	sensitivity of price competition on STL	
	$\rho_{R(LTL)}$	sensitivity of price competition on LTL	
	$\rho_{OIR}$	sensitivity of GDP and LTL on OIR	

### Initialization

We estimate the average duration of long-term loans (LTL) to 10 years. Although the average duration of the mortgage is more than twenty years, we assume that banks have other loans with shorter duration and that some of loans have already been partially paid, for that reason the average duration is approximately the half of the average duration of the mortgage. In case of short term loans (STL), the average duration of 18 months was assumed in the model as in the statistics most of short term loans are given for 12, 18 and 24 months.

Short-term deposits (STD) include the amounts of money deposited for no longer than 6 months. We estimate the average duration to 3 months. In case of long-term deposits (LTD), we consider deposits that are longer than 6 months and we estimate their average duration to 1,5 year. It is due to the large presence of deposits with duration of 12, 18 and 24 months (the proportion of deposits with longer duration is residual).

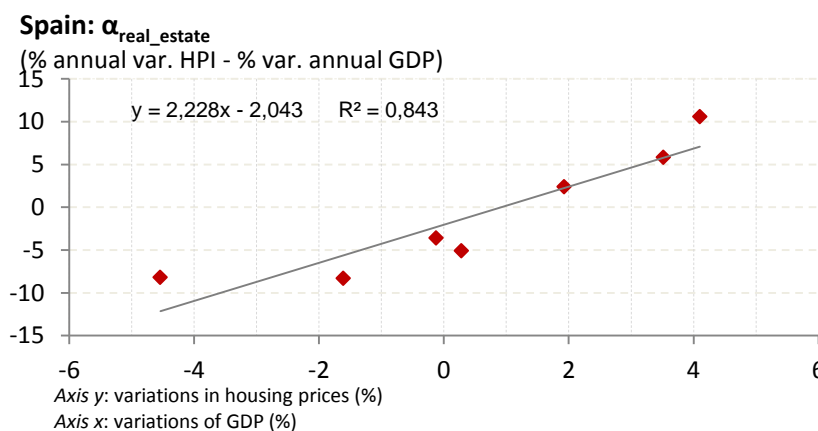


Figure 2: Relation between variations in housing prices (%) and variations of GDP (%). (Source: Own elaboration, 2014).

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In order to compute the value of variable: ' $\alpha_{\text{real\_estate}}$ ' [Fig.2.], we use the following procedure: we take the statistics provided by the Ministry of Economy and Development (*Ministerio de Fomento*) and data on the evolution of GDP provided by Bank of Spain (*Banco de España*) to estimate the linear relation between them in the period between 2005 and 2012. There is no official data available for the period before 2005. In that case, we use a formula presented below [Fig.2.].

In the case of Spain there are no public disaggregated data on total deposits and loans according to their duration so in this case  $\alpha_{\text{LTD}} = \alpha_{\text{STD}}$  [Fig. 3] and  $\alpha_{\text{STL}} = \alpha_{\text{LTL}}$  [Fig. 4]. In the case of deposits for the period 1996-2012 we assume  $\alpha_{\text{LTD}} = \alpha_{\text{STD}} = 0.9792$  while the loans are affected at a higher rate, for that reason:  $\alpha_{\text{STL}} = \alpha_{\text{LTL}} = 1.0792$ . These assumptions can be later relaxed.

To calculate the values of the parameters, we use Spanish data as well. We initiate the monthly change of GDP at value of approx. 0.166, as it gives us a 2% annual growth. Next, it follows bounded random walk, but we assume that it cannot change more than 0,05 % (small changes). During first six months the expected GDP is equal to 0.166, later it becomes the average of the last six periods.

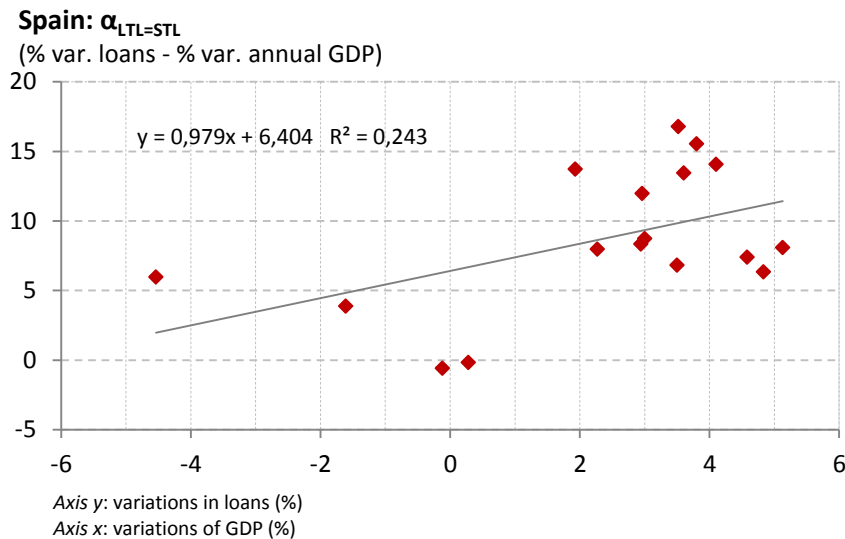


Figure 3: Relation between variations in loans (%) and variations of GDP (%). (Source: Own elaboration, 2014).

As well known, there is a direct relation between the unemployment rate and GDP [Fig. 5]. In case of Spain, a change of 1 percentage point of GDP represents a 8.07% change in the unemployment rate in the opposite direction, assuming 2,7% GDP growth as the basis values and the unemployment rate equal to 9,7% (the average rate of the period 2002-2008).

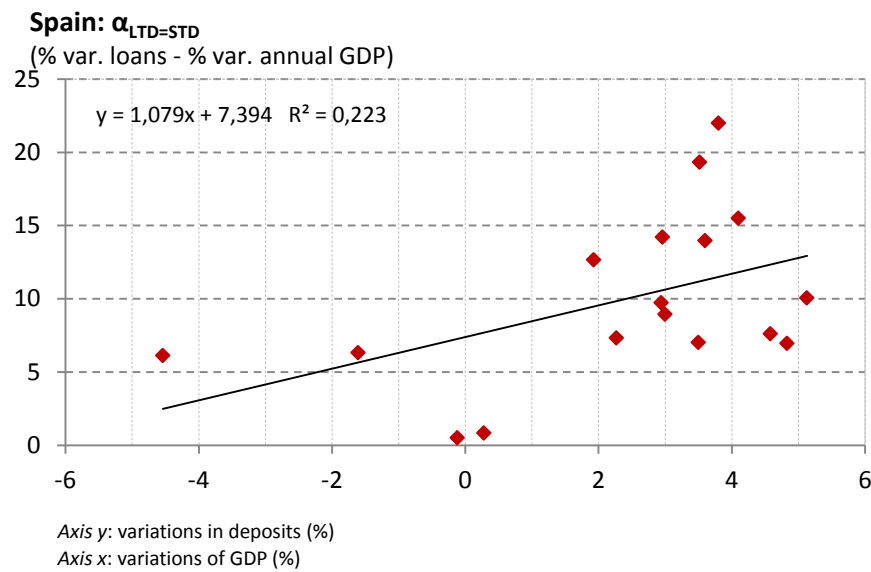


Figure 4: Relation between variations in deposits (%) and variations of GDP (%). (Source: Own elaboration, 2014).

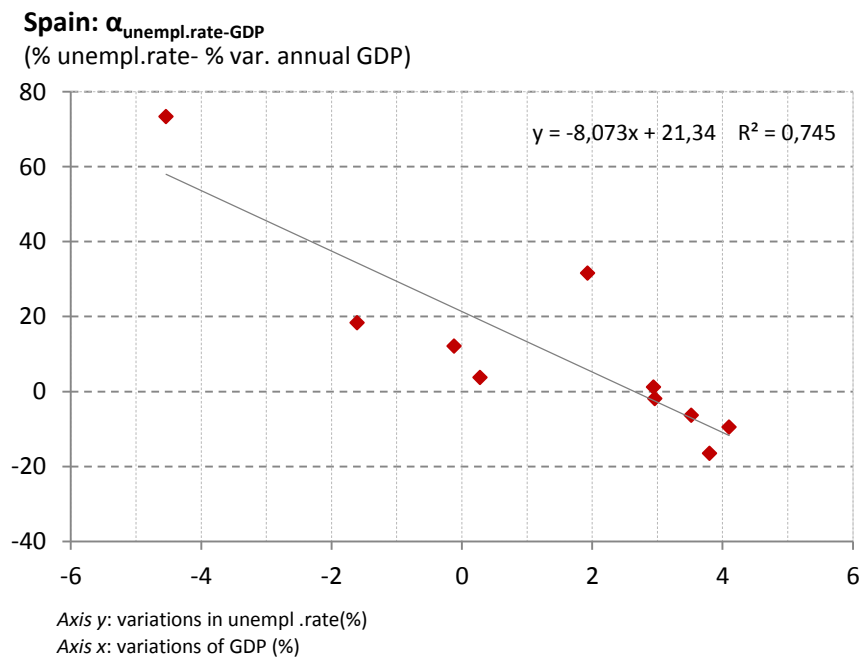


Figure 5: Relation between changes in unemployment rate (%) and variations of GDP (%). (Source: Own elaboration, 2014).

The default rate is the percentage of unpaid loans [Fig. 6]. The average default rate during the period 1999-2007 is 0.5686%. This value was used to initiate the simulation. The default growth rate is inversely proportional to GDP over the period 2000-2012, here we assume:

$$\Delta\% \text{ default rate} = -14.97 \cdot \Delta\text{GDP} + 4.193.$$

The minimum default rate is 0.5% regardless of GDP growth, because despite of high growth rate, as in the period before 2007 in Spain, default rate is never equal to zero.

# THE ROLE OF RISK PERCEPTION IN THE SYSTEMIC RISK GENERATION AND AMPLIFICATION: AGENT-BASED APPROACH

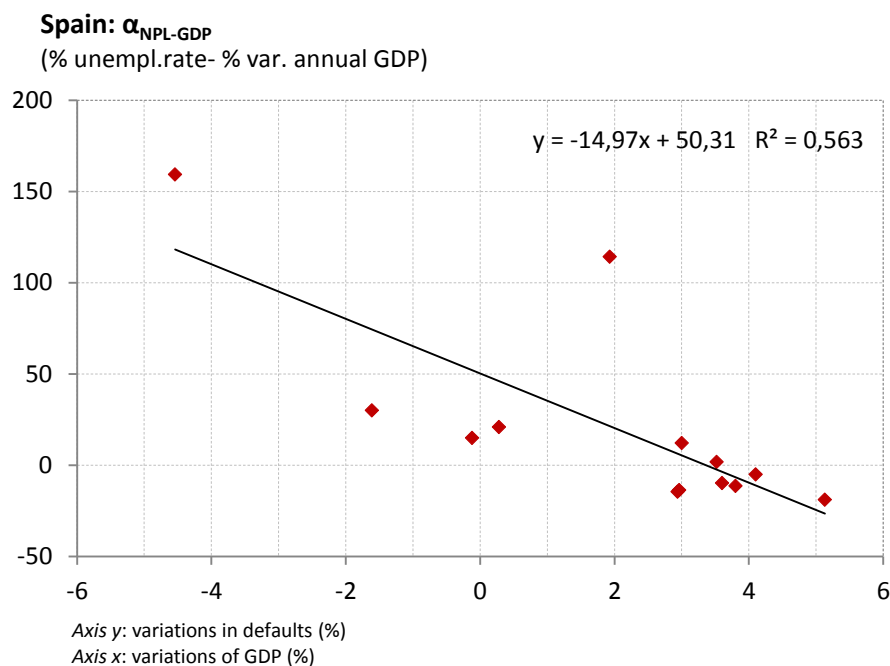


Figure 6: Relation between variations in NPL (%) and variations of GDP (%). (Source: Own elaboration, 2014).

We simulate a relation between the growth rate and non-performing loans in case of Spain (60 periods = 12x5 years) [Fig.7-9].

In the following that figures we can observe:

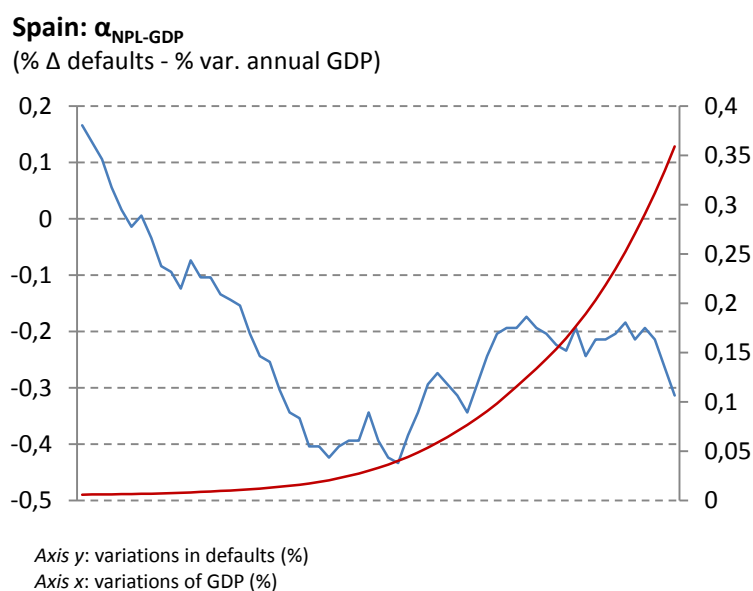


Figure 7: Relation between variations in NPL (%) and variations of GDP (%). (Source: Own elaboration, 2014).

that after 5 year of recession a default rate achieves the level of 35% [Fig. 7].

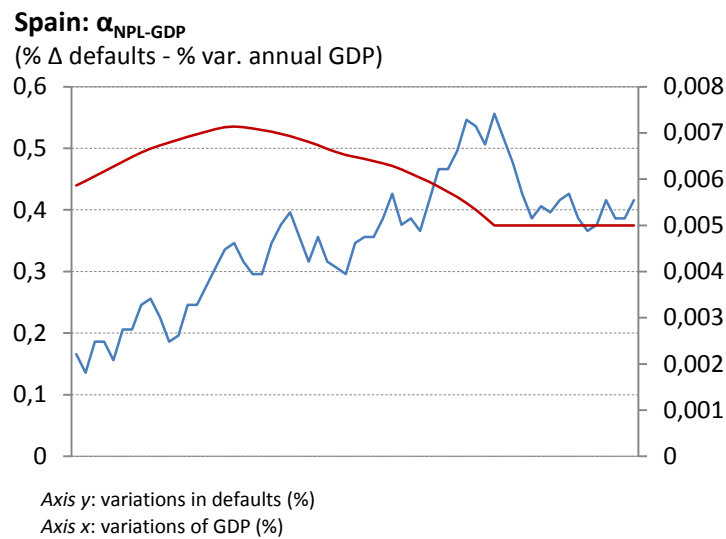


Figure 8: Relation between variation in NPL (%) and variations of GDP (%). Scenario 2. (Source: Own elaboration, 2014).

Alternatively, in the situation of very high growth rate, the NPL declines to minimum (average) level [Fig. 8].

In the situation of annual growth rate at the level of 2%, it hardly changes [Fig. 9]. As in other empirical research (Financial Stability Report - BdE (2007), Hernando and Villanueva (2010), Jimenéz, Ongena, Peydró and Saurina (2008), Nieto (2007)), in our model a direct relation between the annual growth rate and the non-performing loans was taken into account.

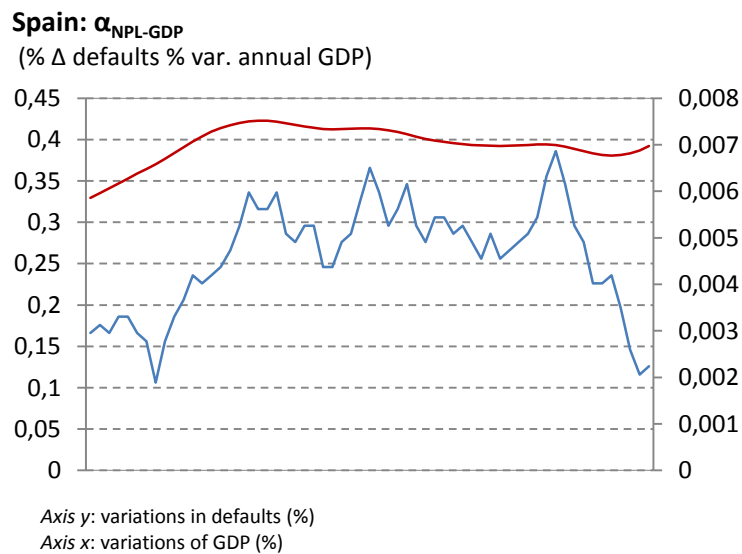


Figure 9: Relation between variations in NPL (%) and variations of GDP (%). Simulation 3. (Source: Own elaboration, 2014).

The official interest rate (OIR) [Fig. 10] is fixed by the ECB in order to keep the inflation low (below 2%). However, the correlation between the growth rate and interest rate is high as the

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ECB tends to reduce the official interest rate when the GDP is falling. For that reason, we can assume:

$$\Delta \text{OIR} = 0.198 \cdot \Delta \text{GDP} - 0.051$$

However, the regulator does not change the value of OIR each month, but rather each quarter or semester. For effects of dynamics in the model we can assume a smooth behavior in order to analyze consequences of the changes in the OIR. If due to reduction in the GDP values, we get to the value of 0.1, we assume that value as a minimum.

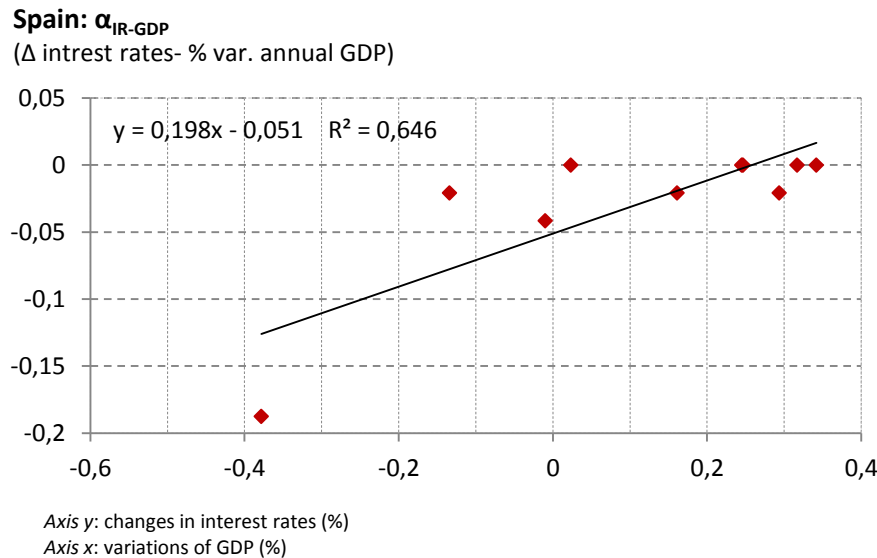


Figure 10: Relation between changes in official interest rate (p.p.) and variations of GDP (%). (Source: Own elaboration, 2014).

The simulation starts with RIR equal to OIR and later it depends on the performance of SRP. The levels of loans and deposits correspond to June 2007 in Spain. They change as the GDP increases or decreases (in amount predicted by the coefficients previously calculated). The initial values of the variables for each bank are provided at first by dividing loans and deposits equally (then we should study what is the disaggregated the effect of size of loans and deposits). The total of reserve requirements is equal to ‘funds’ financial institutions decide to leave apart.

### Behavioral rules

#### *Financial institutions as agents*

Each agent in the model represents one financial institution in the artificial market. The main goal of the agent is to maximize its profits. The objective function is then the difference between the benefits obtained from lending funds (*interest rates* [ $r(LTL), r(STL)$ ] multiplied by the short-term and long-term loans [ $(LTL), (STL)$ ]) and costs of borrowing funds (*interest rates* [ $r(LTD), r(STD)$ ] multiplied by the short-term and long-term deposits [ $(LTD), (STD)$ ]), incremented by the interbank position multiplied by the reference interest rate, official interest rate multiplied by the reserve requirements and reduced by the cost of unpaid loans [*low quality long-term loans* ( $LTLQ$ ) multiplied by the default rate].

*Objective function: Max(Profits)*

$$\text{Max}[r(LTL) \cdot (LTL) + r(STL) \cdot STL - r(LTD) \cdot LTD + r(STD) \cdot STD + RIR \cdot IBP + OIR \cdot RR - \text{default} \cdot LTLQ]$$

In order to compute the values of profits for different values of variables and fixed parameters, we provide data on quantities of short-term and long-term loans, short-term and long-term deposits, interest rates and default rates.

Remark 1: we cannot modify radically quantities of long-term loans and deposits. Assuming an average term of loan (duration) to be 10 years, the maturity is  $1/(12 \cdot 10 \text{ years}) = 0.00833$ . The value of coefficient is rather low. The same applied to deposits:  $1/(18 \text{ months}) = 0.05555$ .

Remark 2: In the model, we assume that if financial institutions are unable to cover the reserve requirements, no more loans are created.

Remark 3: Cash and loans are distributed between the obligatory reserve requirements (RR) and interbank position (IBP). The positive interbank position equals the lending position in the market. At the same time, the reserve requirements shall be at least equal to the quantity that we obtain by multiplying short-term deposits by the reference interest rate  $[RR \geq (RIR) \cdot (STD)]$

#### *Interbank lending market*

Depending on the interbank position (lending or borrowing position), each financial institution needs to decide whether to lend/borrow money on the interbank lending market or deposit/borrow extra funds in the central bank. It depends on at least two variables: systemic risk perception [(SRP)] and *Euribor* as a price of money. Notice, that the inclusion of systemic risk perception to model is direct and based on behavioral rule and it is not necessarily related to the existence of asymmetric or incomplete information as in the general equilibrium models and/or purely empirical research (for an interesting contribution about the importance of liquidity hoarding and counterparty risk in the U.S. overnight interbank market see: Alfonso, Kovner and Schoar (2011)). Additionally, we do not have to narrow our analysis only to the changes of interest rates as a result of variations in the systemic risk perception. It is not the only one procedure of inclusion of perception of risk in the behavioral rules of agents. Nonetheless, it is useful to emphasize the difference between quantification of systemic risk perception in terms of differential in interest rates and [(SRP)] as a *pure interpretation* of events ('subjective probability of at least one financial institution to be bankrupt in a month' in our case or 'perceived probability of a high-impact event in the UK financial system' as in the Bank of England research). This distinction has further implications for analyses of mutual relations (including network dynamics, the perception of similarity and popularity etc.) between agents in normal and adverse scenarios during crisis. Here we can also distinguish between the systemic risk generators and factors that threaten the financial stability due to being a consequence of external shocks. The bankruptcy of institutions can be treated as a factor that initiates the intrinsic dynamics of the system and forces changes 'from within' the system. Alternatively, a perceived probability of high-impact event is rather related to the systemic risk as a process exogenous in its nature and closely related to the interpretation of general equilibrium theory (the 'core approach' (Caballero (2010))).

If short-term and long-term deposits are lower than the sum of three components: reference interest rate multiplied by the short-term deposits, long-term high-quality and low-quality

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loans and short-term loans, agent can borrow money on the interbank lending market. In such situation, financial institution is in the borrower position [(IBP<0)]. Alternatively, if the sum of short-term and long-term deposits are higher than the aforementioned sum of components, financial institution is in the lending position [(IBP>0)]. Thus, it can deposit extra funds in the bank or in the interbank lending market as it has been already explained.

$$IBP = RIR \cdot STD + LTHQL + LTLQL + STL - STD + LTD$$

*If we observe that*

$STD + LTD < RIR \cdot STD + LTHQL + LTLQL + STL$  (financial institution can borrow money on the interbank lending market),

*Else*

$STD + LTD > RIR \cdot STD + LTHQL + LTLQL + STL$  (financial institution can deposit extra funds in the central bank or in the interbank lending market)

*End if*

*If everything goes right:*

$$IBP += RIR \cdot STD + LTHQL + LTLQL + STL - STD + LTD$$

*Else*

(part is assigned to IBP) and (another part to RR)

*End if*

In case of potential default of financial institution, central bank can lend money to the bank (see: *Scenarios 0-4 and rationale: Scenario 2*).

Additionally, the interest rate can change. There are many mechanisms and channels for interest rate to influence the quantity of loans and deposits. Moreover, the problem of quality of loans and deposits appears. We have 5 variables: interest rate of high quality long-term loans [r(LTLHQ)], interest rate of low-quality long term loans [r(LTLLQ)], interest rate of short-term loans [r(STL)], interest rates of long-term [r(LTD)] and short term deposits [r(STD)]. If interest rates are different from the average in the sector, then demand has to change. Additionally, in short periods of time, we can change only interest rates of short-term loans and deposits [r(STL)] and [r(STD)], because long-term deposits [(LTD)] are predefined. Long-term high quality and low quality loans are equal to the sum of three components: *Euribor*, reference interest rate and the coefficient that expresses the relation between perceptual variations in long-term loans and the perceptual changes in GDP growth:  $\alpha_{LRL}$ . [Euribor + RIR +  $\alpha_{LRL}$ ].

Finally, it is necessary to introduce the parameter of sensibility of demand of deposits and loans with respect to changes in the interest rates (the offered and average interest rates in the market). The corresponding rules are expressed as follow:

$$LTD = \alpha_{LTD} \cdot GDP\_growth \cdot \rho_{r(LTD)}(r(LTD) - ar(LTD)) / ar(LTD)$$

$$STD = \alpha_{STD} \cdot GDP\_growth \cdot \rho_{r(STD)}(r(STD) - ar(STD)) / ar(STD)$$

$$LTL = \alpha_{LTL} \cdot GDP\_growth \cdot \rho_{r(LTL)}(r(LTL) - ar(LTL)) / ar(LTL) \cdot \beta_{r(LTL)}(r(LTL) - OIR)$$

$$STL = \alpha_{STL} \cdot GDP\_growth \cdot \rho_{r(STL)}(r(STL) - ar(STL)) / ar(STL) \cdot \beta_{r(STL)}(r(STL) - OIR)$$

Additionally to GDP growth rate and difference between interest rate and average interest rate [r(x) and ar(x)], loans depend on a specific interest rate previously fixed for making a transaction. The same logic holds for deposits because one could choose between bonds or shares in the market, nonetheless, at that point of simulation we assume the most simplified version of the model. Systemic risk perception update was also considered in the model. It is an updating rule that depends on the value of default rate of LTLQL, on conditions in the interbank market and changes in profits.

#### *SRM – interest-rate based measure of systemic risk*

In our analyses, we have primarily focus on modeling behavioral rules and interpretive approach to measurement of systemic risk perception. Nonetheless, we can still study the ‘interest-rate based’ measures of systemic risk. In this case, we compute a measure of systemic risk that depends on a differential between the level of reference interest rate and the official interest rate as well as a differential between short-term interest rate and the official interest rate. It is computed as follows:

$$A = (RIR - OIR) / OIR$$

$$B = (SIR - OIR) / OIR$$

$$SRM = A/B$$

where RIR is a reference interest rate, OIR – official interest rate, SIR states for short-interest rate. The systemic risk measure values varies between 0 and 1 while 0 states for no systemic risk at all in the system and 1 expresses the maximum level of systemic risk in the market [Tab.4].

Table 4: Computation of interest-rate based systemic risk measure. (Source: Own elaboration, 2014).

Variables	Default rate (from 0 to 100)	Value	Results			Systemic Risk Measure	SRM
(RIR-OIR)/OIR			0,2	A	A/B	0,1	
(SIR-OIR)/OIR			2	B		This is a measure of systemic risk (from 0 to 1)	
	OIR	1					
	RIR	1,2				1 = max systemic risk	
	Short-term interest rate (SIR)	3				0 = min systemic risk	

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The systemic risk measure/indicator is influenced by:

- changes in the defaults rates

(according to Bank of Spain nomenclature: '*tasa de morosidad*')

- homogeneity or heterogeneity of banks
- different sizes of banks (small, medium and big ones)

In case of simulation of Spanish financial sector in 2007, the full heterogeneity of the system was assumed [Fig.13]

### Methodology:

We develop a simple indicator SRM (systemic risk measure) that is useful in further simulations and we carry out Monte Carlo simulations assuming: different defaults rates, homogeneity or heterogeneity of banks, different sizes of banks.

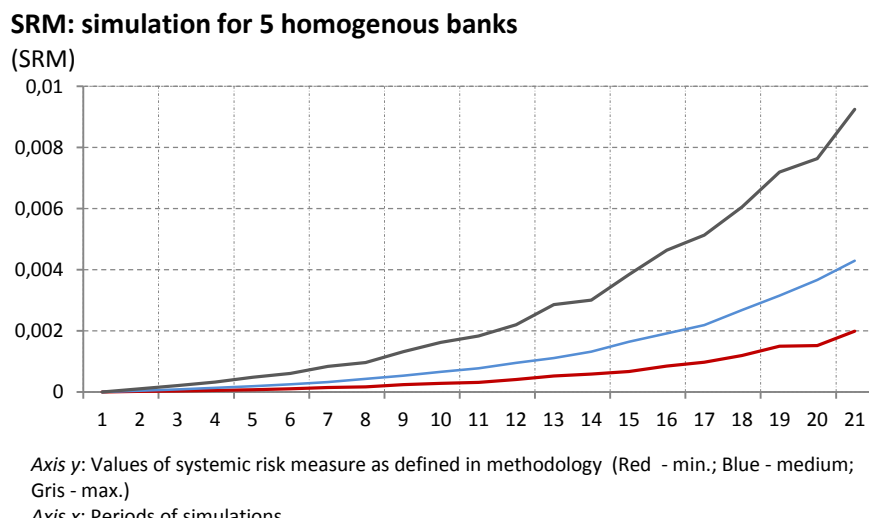


Figure 11: Simulation for 5 homogenous banks (Source: Own elaboration, 2014).

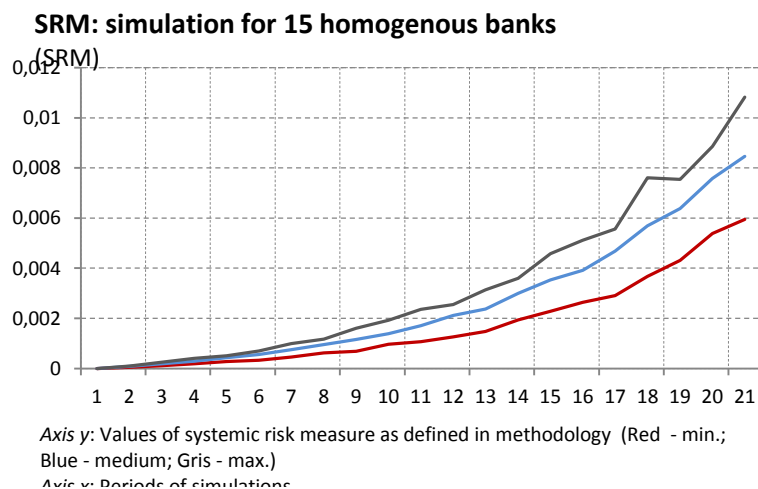


Figure 12: Simulation for 15 homogenous banks (Source: Own elaboration, 2014).

In all three cases we observe that as the simulation is taking place GDP and housing price decrease and heterogeneity of banks increases, the minimum, medium and maximum levels of systemic risk increase as well [Fig. 14]. When we start the market with fifteen homogeneous banks instead of five, the average systemic risk index is higher than in the scenario with only five banks. If we study the actual distribution in 2007 of the Spanish bank system, the level of systemic risk increases up to a 6% in five years. This value is not low because zero implies a null probability of default but the unit means banks have the same default risk of individuals and enterprises so they are charged the same interest rate.

**SRM: simulation for Spanish financial sector**  
(SRM)

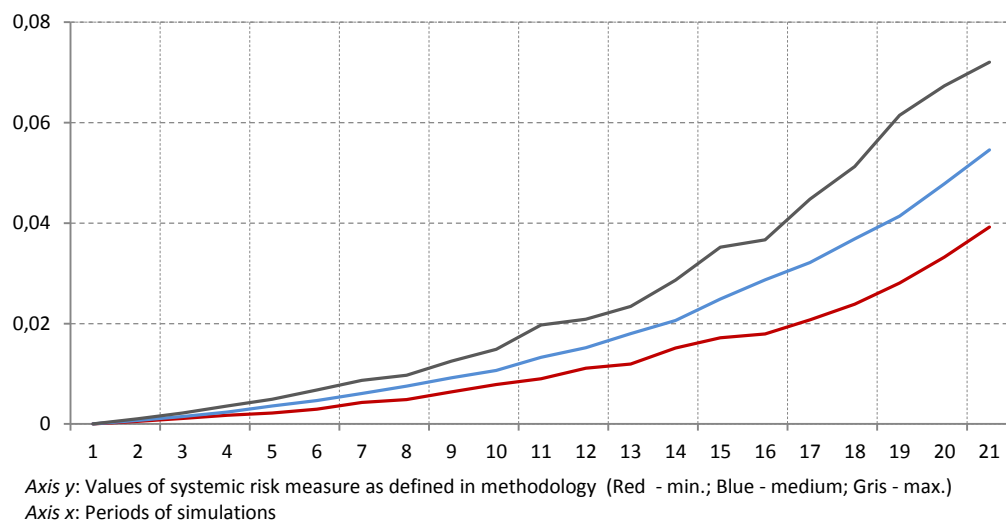


Figure 13: Simulation for Spanish financial sector (2007). (Source: Own elaboration, 2014).

**Comparison of medium SRMs**  
(SRMs medium)

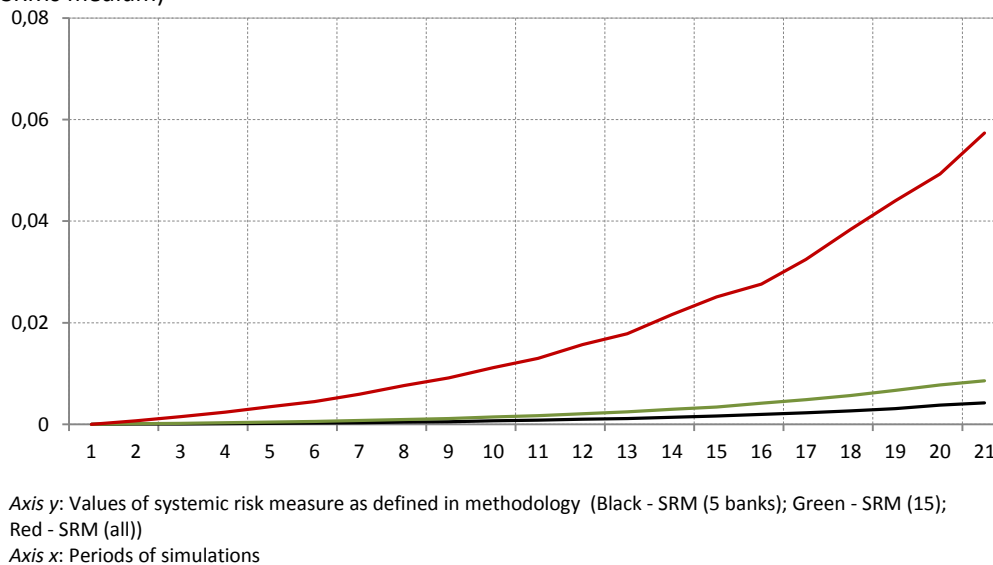


Figure 14: Comparison of simulation results. (Source: Own elaboration, 2014).

## Conclusions and Further research

In the paper we studied how systemic risk depends on the market participants' perception of risk and perception of risk attitudes of the other market participants. We showed that the perception of risk has been studied in many fields of research. The insights from the social amplification of risk framework (SARF) together with the agent-based modeling (ABM) seem to be the most useful in the context of systemic risk measurement and modeling as well as from the regulatory perspective.

In the article, we explained the logic of one of the NCN framework for modeling systemic risk generation and amplification. The objective of our model was to show the role of risk perception and perception of risk attitudes in the systemic risk generation and amplification. The general equilibrium theory used to narrow the systemic risk research to analyses of adverse effects of external shocks. Nonetheless, the perception of risk and the perception of risk attitudes can fasten the self-organization of the system and can lead to emergence of new kinds of risks 'from within the economy or financial system' that would generate the systemic effects. Our analysis has direct implications for regulatory practice and macroprudential policies. In the broader context, the notion of systemic risk endogeneity is redefined as well. In the NCN framework we seek to use the agent-based approach to model different aspects and mechanisms of systemic risk generation and amplification. We also compare our results to the main econometric forecasting models (including dynamic stochastic general equilibrium models) that are currently being used in many public institutions.

The main objectives of this article were to emphasize the role of risk perception and risk attitudes in the systemic risk generation and amplification and to show the importance of new modeling techniques such as the agent-based approach. The results of simulations presented in the article ought to be compared to results of other empirical studies based on 'the core methodologies'. It is important to compare how systemic risk perception can be understood and included in the model. In the presented model, the systemic risk perception has been modeled as a behavioral rule. Nonetheless, a systemic risk measure based on the difference between interest rates has also been studied. That element of analysis can be easily compared to the quantification method used by Gara, Kovner and Schoar (2011). The authors examined "the importance of liquidity hoarding and counterparty risk in the US overnight interbank market during the financial crisis of 2008. Their findings suggest that counterparty risk plays a larger role than does liquidity hoarding: the day after Lehman Brothers' bankruptcy, loan terms become more sensitive to borrower characteristics. In particular, poorly performing large banks saw an increase in spreads of 25 basis points, but were borrowing 1 percent less, on average. Worse performing banks do not hoard liquidity. Worse performing banks did not freeze entirely, it did not seem to expand to meet latent demand (Gara, Kovner and Schoar (2011))".

The open question is whether the analysis of interest rates differentials presented in the paper can be treated as the 'true' systemic risk perception measure. Without doubts, the agent-based simulation techniques can help us to determine the role of counterparty risk and liquidity hoarding ex-post but they can also be a useful tool to carry out counterfactual simulations for the regulatory and governance practice. The 'periphery models' seem to be a great alternative to the 'core models'. Further research on measurement and modeling techniques as well as on the role of perception of risk attitudes is urgently needed.

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# COMPREHENSIVE INCOME AND FIRM REPORTING CHOICES

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**Abstract:** *In this paper, we explore the authoritative accounting pronouncements related to income presentation. We conduct a chronological review of literature and highlight the position taken by standard setters in the context of all-inclusive and current operating performance concepts of income over the years. The emphasis of standard setters has shifted from the all-inclusive and current operating performance concepts to a hybrid approach, which substantially incorporates the two concepts. Pressure from financial statement users and some internal motivation of the standard setters lead to the reporting of comprehensive income. The reporting location of comprehensive income relates to the size and direction of other comprehensive income components and firm size. Therefore, we intend to find the correlation of firms' comprehensive income reporting choices and firm size for Pakistani firms; whether small businesses differ in location choices as compared to large businesses. Further, we wish to examine the relation between the size and direction of comprehensive income components and reporting choices.*

**Keywords:** *Comprehensive Income, All-Inclusive Income, Current Operating Performance*

## Introduction

This paper explores one of the controversial issues in accounting; income reporting. A review of literature shows that it broadly relates to the choices of reporting income either via the all-inclusive or current operating performance concept.<sup>i</sup> We investigate the reporting of income since 1930s to its most recent form, i.e., comprehensive income reporting. Comprehensive income is the culmination of a long-standing debate between all-inclusive and current operating performance (Dhaliwal et al., 1999).

Despite having a preference for all-inclusive income and a single statement of comprehensive income, both the International Accounting Standard Board (IASB) and the Financial Accounting Standard Board (FASB) have not been able to achieve this objective. The FASB's Exposure Draft: *Reporting Comprehensive Income* requires a clear display of comprehensive income and its components in a statement of performance (FASB, 1996).<sup>ii</sup> However, Statement of Financial Accounting Standard No. 130 (SFAS 130): *Reporting Comprehensive Income* does not specify the statement in which comprehensive income must be displayed. Similarly, the IASB allows a one or two statement option in International Accounting Standard No. 1 (IAS 1): *Presentation of Financial Statements* for the reporting of comprehensive income (IASB, 2007).

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Studies focusing on the reporting choices of comprehensive income and its components have mainly been undertaken in the US and in the context of the introduction of SFAS 130 (e.g., Bhamornsiri and Wiggins, 2001; Jordan and Clark, 2002; Kreuze and Newell, 1999; Pandit and Phillips, 2004). Hirst & Hopkins (1998) provide evidence that display matters. Size and direction of other comprehensive income items affect the reporting choice of firms (Jordan and Clark, 2002), however, company size is also a factor in determining the reporting location of comprehensive income (Campbell et al., 1999).

The objective of this paper is to identify the relevant accounting pronouncements that ultimately led to the reporting of comprehensive income. Further, we intend to find out the correlation of firms' comprehensive income reporting choices and firm size for Pakistani firms; whether small businesses differ in location choices as compared to large businesses. In addition, we wish to examine the relation between the size and direction of comprehensive income components and reporting choices.

We conduct a chronological review of the accounting literature and identify the authoritative accounting pronouncements for income reporting issued from 1939 until 1959 by the American Institute of Accountants (now known as the American Institute of Certified Public Accountants (AICPA)). Further, we identify the relevant opinions issued by the Accounting Principles Board (APB) from 1959 until 1973. Finally, we examine the relevant statements of financial accounting standards issued by the FASB since 1973 until recently.

Over the years, standard setters have introduced different accounting standards, which sometimes have encouraged the all-inclusive approach and at times the current operating performance approach (e.g., Accounting Research Bulletin No. 8 (ARB 8): *Combined Statement of Income and Earned Surplus*; ARB No. 32: *Income and Earned Surplus*; ARB No. 35: *Presentation of Income and Earned Surplus*; ARB No. 41: *Presentation of Income and Earned Surplus*; Opinion No. 9: *Reporting the Results of Operations*; SFAS 130, *Reporting Comprehensive Income*).

We contribute to the accounting literature by providing a thorough analysis of the accounting standards issued for income reporting. The paper highlights management's reporting choices for comprehensive income. An output of the IASB/FASB joint project 'Financial Statement Presentation' is a discussion paper: *Preliminary Views on Financial Statement Presentation* (IASB, 2008), which proposes a single statement of comprehensive income. The proposed work in this paper might have implications for the standard setters who are in the process of introducing a single statement of comprehensive income.

The remaining paper is organized as follows. Section 2 describes the background of reporting income via the all-inclusive approach or the current operating approach. Section 3 describes the different accounting pronouncements that relate to income reporting. Section 4 describes firms' comprehensive income reporting choices. Section 5 identifies the future research area that the authors intend to undertake while section 6 concludes the paper.

### Background

The issue of reporting income has been controversial in the accounting profession since the 1930s. It is related to the choices for reporting income either via the all-inclusive or current operating performance concept, i.e., clean surplus or dirty surplus accounting respectively. The American Institute of Accountants formed the Committee on Accounting Procedure (CAP) in 1939, which had the task of setting accounting standards in the United States. The CAP issued

Accounting Research Bulletin (ARB) No. 32: *Income and Earned Surplus* in December 1947, which defines the all-inclusive income as:

*“[n]et income is defined according to a strict proprietary concept by which it is presumed to be determined by the inclusion of all items affecting the net increase in proprietorship during the period except dividend distributions and capital transactions”* (ARB No. 32, p. 260).

Similarly, the concept of current operating performance is defined as:

*“[p]rincipal emphasis upon the relationship of items to the operations, and to the year, excluding from the determination of net income any material extraordinary items which are not so related or which, if included, would impair the significance of net income so that misleading inferences might be drawn therefrom”* (ARB No. 32, p. 260).

## **A Chronological Review of the Authoritative Accounting Pronouncements for Income Presentation**

### *ARBs Issued by CAP*

In February 1941, the CAP issued ARB No. 8: *Combined Statement of Income and Earned Surplus*. In this bulletin, the CAP showed a definite preference for the all-inclusive income concept (Kiger and Williams, 1977). Though the CAP did not ask for the general adoption of the practice of combining income statement with the statement of earned surplus, it did weigh more the advantages of such a statement than the disadvantages. Although the CAP recommended a combined statement but did not specify the nature of profit and loss items or the charges to be made to earned surplus. The inability to do so led to the development of the combined statement of income and retained earnings (Kiger and Williams, 1977).iii

In ARB No. 32, the CAP retained its stance expressed in ARB No. 8 that all items of profit and loss recognized during the period should be used in determining the figure reported as net income. However, items which in the aggregate were material in relation to net income and were clearly not identifiable with or did not result from the usual or typical business operations were to be excluded from net income. Net income was to be clearly stated and extraordinary items were either to follow on the income statement at the bottom after net income or in the statement of retained earnings (ARB No. 32, para. 12).

The CAP issued ARB No. 35: *Presentation of Income and Earned Surplus* in 1948, which was indicative of the CAP straying away from the all-inclusive to the current operating performance concept. The CAP showed concerns over the method of reporting all profits and losses in a combined statement. Many income statements were presented in a manner and with wording which led to misconceptions as to whether the earnings for the period were the amounts captioned as net income or were the final and more prominent amounts (ARB No. 35, para. 1).

In July 1951 the CAP issued ARB No. 41: *Presentation of Income and Earned Surplus*, as a supplement to ARB No. 35. The issuance of this bulletin was an attempt to moderate the strong current operating performance stance of the CAP in ARB. 35 (Kiger and Williams, 1977). In 1953 the CAP issued ARB No. 43: *Restatement and Revision of Accounting Research Bulletins*, in which chapter No. 8: *Income and Earned Surplus*, reinforced CAP's stance in ARB No. 35 and ARB No. 41.

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### *Opinions Issued by Accounting Principles Board*

The CAP was replaced by the Accounting Principles Board (APB) in 1959, which issued pronouncements on accounting principles until 1973. There was no significant pronouncement on income presentation after ARB No. 43 until 1966 when the APB issued its Opinion No. 9: *Reporting the Results of Operations*. The APB took the stance that net income should reflect all items of profit and loss recognized during the period with the exception of prior period adjustments. Extraordinary items were segregated from the results of ordinary operations. Two income figures were to be disclosed in the income statement, i.e., income before extraordinary items and income after extraordinary items (APB 1966, paras.17-20). Opinion No. 9 by APB was a clear indication of favouring the all-inclusive income approach (SFAS 130, para. 2; Johnson et al., 1995).

In June 1973 the APB issued Opinion No. 30: *Reporting the Results of Operations-Reporting the Effects of Disposal of a Segment of a Business, and Extraordinary, Unusual and Infrequently Occurring Events and Transaction*. Net income figure was essentially based on the all-inclusive income concept (Kiger and Williams, 1977). Prior period adjustments were excluded from the statement and a new income figure was introduced that was mainly based on the current operating performance concept. The APB included the terms 'continued operations' and 'discontinued operations' in its opinion (APB 1973, para. 8). The new income figure of 'net income from continuing operations' was determined on the current operating performance concept and going concern basis. Discontinued operations were made a part of net income before extraordinary items, which was in stark contrast of APB Opinion No. 9, whereby the sale or abandonment of plant or a significant segment of the business was considered extraordinary item (APB 1966, para. 21).

Kiger and Williams (1977) argued that over the period 1941-1977, emphasis shifted from the all-inclusive and current operating performance concepts to a hybrid approach that substantially incorporated both the concepts.

### *Statements Issued by FASB*

The FASB replaced the APB in the year 1973. Since then FASB has been developing accounting standards in the US. According to Walsh (1996), the period of 1975-1980 marked the zenith of clean surplus accounting. The FASB issued SFAS 8: *Accounting for the Translation of Foreign Currency Transactions and Foreign Currency Financial Statement* in 1975 and SFAS 16: *Prior Period Adjustments* in 1977. The FASB explicitly favoured the all-inclusive concept of income and argued that a gain or loss resulting from an exposure to exchange rate changes should be included in the determination of net income in accordance with the all-inclusive income statement (SFAS 8, para. 183).

The FASB did recognize that requiring income determination on all-inclusive basis would increase the volatility of reported income. However, the FASB rejected the presumption that one of the functions of accounting is to minimize reporting fluctuation. The FASB argued that exchange rates do fluctuate and accounting should not give the impression as if the rates are stable (SFAS 8, paras. 198 and 199). Further support for the all-inclusive income was evident when the FASB issued SFAS 16 and required the inclusion of prior period adjustment in income determination.<sup>iv</sup>

SFAS 8 was strongly opposed in the financial community (Ziebart and Kim, 1987). In a survey of 117 corporate executives, Massaro (1978) found 60 executives favoured the revoking

of SFAS 8 while 24 favoured substantial modifications or amendments. It was mainly opposed on the grounds that it made income vulnerable to changes in foreign exchange rates. Therefore, the FASB revisited the issue of foreign currency translation and issued SFAS 52: *Foreign Currency Translation* in 1981. The currency translation method and the recognizing of gains and losses in SFAS 8 were mainly opposed (SFAS 52, para. 152). SFAS 52 gave way to companies to recognize translation gains and losses as a separate component of owners' equity and excluded them from income determination. Hence, the FASB strayed away from the all-inclusive concept required in SFAS 8.

In December 1980 the FASB introduced the term 'Comprehensive income' in Statement of Financial Accounting Concept No. 3 (SFAC 3): *Elements of Financial Statements of Business Enterprises*, which was superseded by SFAC 6: *Elements of Financial Statements* in 1985. Comprehensive income was defined as:

*"Comprehensive income is the change in equity of a business enterprise during a period from transactions and other events and circumstances from nonowner sources. It includes all changes in equity during a period except those resulting from investments by owners and distributions to owners"* (SFAC 3, para. 56; SFAC 6, para. 70).

The broad definition of comprehensive income in Concepts Statements was consistent with the all-inclusive income concept (Johnson et al., 1995). The board reserved the word "earnings" for an income measure somewhat narrower than comprehensive income (SFAC 3, para. 58). However, by doing so the board left the door open for also reporting an income measure more in keeping with the current operating performance concept (Johnson et al., 1995).

Instead of recognizing the volatility of income that resulted due to subsequent remeasurement of assets and liabilities at market prices, the FASB argued in SFAS 52 that the new concept of comprehensive income was the rationale for including translation gains and losses in owners' equity (Walsh, 1996).

SFAS 8 was mainly opposed because it made the earnings more volatile, the FASB by introducing SFAS 52, set a precedent for posting items directly to owners' equity. This method was introduced as a solution to the problem of remeasuring items at market prices, which was reflected in FASB's later pronouncements (Walsh, 1996). In 1985 the FASB issued SFAS 87: *Employers' Accounting for Pensions*, which required that if an additional liability required to be recognized exceeds unrecognized prior service cost, the excess (which would represent a net loss not yet recognized as net periodic pension cost) shall be reported as a separate component (that is, a reduction) of equity (SFAS 87, para. 37). This standard again allowed a direct adjustment to owners' equity. However, instead of comprehensive income as the rationale, the FASB focused on the volatility argument (SFAS 87, para. 173-190).

FASB further moved away from the all-inclusive income approach by introducing SFAS 115: *Accounting for Certain Investments in Debt and Equity Securities* in 1993 (Walsh, 1996). This standard required unrealized gains and losses on available-for-sale securities to be excluded from earnings and reported as a separate component of shareholders' equity until realized (SFAS 115, para. 13). The FASB decided to exclude the unrealized holding gains and losses for available-for-sale securities from earnings because of the concerns about the potential volatility, which would result from reporting the fair value changes of only some assets, and no liabilities, in earnings (SFAS 115, para. 79).

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After issuing SFAS 115, FASB apparently took a completely reversed position than what it held in SFAS 8 and the idea that accounting should reflect the instability of market prices was displaced by the pragmatic concern over the volatility of reported income (Walsh, 1996).

### *Reporting Comprehensive Income*

The creation of the all-inclusive term, comprehensive income, results from a desire to incorporate in one final figure all nonowner changes in equity for a period (Robinson, 1991, p. 108). Robinson (1991) argued that the increasing complexity of business, the diversity of businesses reported on, the controversial nature of the items on the FASB's agenda, and the sophistication of the user community all argued for a full, comprehensive income presentation. Sutton and Johnson (1993) urged the creation of a new statement that would link the income statement and the balance sheet. It would accommodate fair value measures in a balance sheet without having to report changes in those fair values in an income statement.

Though the FASB generally adopted the all-inclusive income approach, it did not require the reporting of comprehensive income (Johnson et al., 1995; Cope et al., 1996). The Association for Investment Management and Research (AIMR), one of the largest users of financial statement information, specifically urged that the concept of comprehensive income be put into practice (SFAS 130, para. 40; Johnson et al., 1995). The AIMR (1993) was very sceptical about some of the exceptions that were kept by FASB in standards that allowed certain items to bypass the income statement and go directly to the equity section of the balance sheet (e.g., SFAS 52 and SFAS 115).

Besides external factors, there was internal motivation for the board to undertake a project on comprehensive income, which stemmed from the board's financial instruments project, particularly the portion dealing with derivatives and hedging (SFAS 130, para. 45; Cope et al., 1996). Many financial instruments were off-balance sheet and as a part of the board's financial instruments project, the board was considering the recognition of some of those in the financial statements (Johnson et al., 1995). The board members publicly favoured the recognition and measurement of financial instruments at fair value and revealed the board's tentative decision in the derivative and hedging project to recognize and measure all derivative instruments at fair values (SFAS 130, para. 46; Johnson et al., 1995; Cope et al., 1996).

In response to the concerns raised by financial statements users for having an all-inclusive income measure, the FASB in June 1996 issued an exposure draft. The exposure draft proposed that companies should display all changes in equity other than those resulting from transactions with owners in their capacity as owners in a statement of performance (FASB, 1996). The main aim of the draft was to streamline the flow of components of comprehensive income and make them go through a statement of performance, which at that time were reported directly in equity (Smith and Reither, 1996).

The FASB issued SFAS 130, *Reporting Comprehensive Income* in June, 1997. The provisions of this statement are effective for fiscal years beginning after December 15, 1997. The exposure draft required a clear display of comprehensive income and its components in a statement of performance (FASB, 1996). In its deliberations leading to the exposure draft, FASB noted that including comprehensive income and its components in a statement of financial performance was under the all-inclusive income concept (SFAS 130, para. 58). However, the final standard SFAS 130 does not specify the statement in which comprehensive income must be displayed.v

Chambers et al. (2007) note that comprehensive income, as defined by the FASB, is not an all-inclusive income measure. It does not satisfy the clean surplus relation as certain non-owner changes in equity, not specifically mentioned in SFAS 130 and SFAS 133 need not be reported as components of other comprehensive income. For example, APB Opinion No. 25: *Accounting for Stock Issued to Employees*, AICPA Statements of Position No. 93-6 (SOP 93-6): *Employers' Accounting for Employee Stock Ownership Plans* and SOP 90-7: *Financial Reporting by Entities in Reorganization Under the Bankruptcy Code* (SFAS 130, paras. 108-119).

The US was not the first country to require the reporting of comprehensive income. The United Kingdom (UK) Accounting Standard Board (ASB) issued Financial Reporting Standard No. 3 (FRS 3): *Reporting Financial Performance* in 1992, which introduced a “statement of total recognized revenues and expenses” as a supplement to the “profit and loss account” (the UK equivalent to the US income Statement). The bottom line of that statement was similar to the FASB’s definition of comprehensive income (SFAS 130, para. 42).

## **Comprehensive Income Reporting Choices**

Since SFAS 130 does not specify the statement in which comprehensive income and its components must be displayed, many studies investigate the reporting choices of firms. Campbell et al. (1999) observe that 53 percent of their sample companies report comprehensive income in the statement of changes in equity. They also observe that companies opting for this format are generally large and have materially negative amount of other comprehensive income, averaging 17 percent of net income. Companies opting to report comprehensive income in a performance statement tend to be small and have positive comprehensive income, averaging 81 percent of net income.

Jordan and Clark (2002), for a sample of financial services firms, find that after SFAS 130, the majority of the firms (63 percent) opt to report comprehensive income in the statement of changes in equity. They observe that firms with negative other comprehensive income have a high propensity to report comprehensive income in a statement of changes in equity. Further, they observe that generally firms with larger other comprehensive income tend to choose a performance statement to report comprehensive income while firms with lower other comprehensive income seems inclined towards a non-performance based method of presenting.

Hirst and Hopkins (1998) provide evidence in laboratory settings that the display of earnings matters. They show that comprehensive income in a single statement is more effective in communicating value relevant information than reporting it in a statement of changes in equity. Further, it is useful in detecting earnings management. However, Chambers et al. (2007) find that the incremental information of comprehensive income components is higher when reported in a statement of changes in equity. They argue that this is the reason the majority of firms opt to disclose through the statement of changes in equity. Maines and McDaniel (2000) show that the display of comprehensive income is also important for nonprofessional investors. Hunton et al. (2006) find that preparers are more likely to engage in earnings management involving available-for-sale securities when comprehensive income is reported in a statement of changes in equity than when comprehensive income is reported in a performance statement. Tarca et al. (2008) show that financial statement users can understand a single statement of

comprehensive income, including a matrix format of comprehensive income proposed by Barker (2004).

### **Future Research**

Pakistani firms have been complying with International Accounting Standards (now known as International Financial Reporting Standards (IFRS)) since 1985. The Securities and Exchange Commission of Pakistan (SEC) and the Institute of Chartered Accountants of Pakistan (ICAP) have ensured full compliance with IFRS since 2009. As per IAS 1 (2007); firms are required to report comprehensive income in a single statement or in a separate statement of performance. We wish to investigate comprehensive income reporting choices of Pakistani firms. Although only listed firms are required to comply with IFRS, ICAP also issues Financial Reporting Standards for Medium-Sized entities (MSE) and Small-sized entities (SSE), whereby firms are to seek guidance from IAS/IFRS as well (ICAP, 2006, Para. 14).

Based on the discussion so far, we intend to investigate comprehensive income reporting choices of small and large firms in Pakistan. We intend to find out the correlation of firms' comprehensive income reporting choices and firm size; whether small businesses differ in location choices as compared to large businesses. In addition, we wish to examine the relation between the size and direction of comprehensive income components and reporting choices.

### **Conclusion**

This paper highlights a long standing debate in the accounting literature between the all-inclusive and the current operating performance concepts for reporting income. The paper explores the authoritative accounting pronouncements related to income presentation. The paper reviews the position taken by standard setters in the context of all-inclusive and current operating performance concepts of income over the years. The review goes back as far as 1940s and discusses until recent developments. It is observed that during the period of 1940 to 1975, the emphasis of standard setters has shifted from the all-inclusive and current operating performance concepts to a hybrid approach, which substantially incorporates the two concepts (Kiger and Williams, 1977). The period of 1975-1980 promotes the clean surplus accounting, which is followed by a series of pronouncements that support direct adjustments to equity (Walsh, 1996). The practice of allowing items to be taken directly to equity prevails until the 1990s. Due to the pressure from financial statement users and some internal motivation of the standard setters lead to the reporting of comprehensive income. Finally, the paper identifies the future research work that the authors intend to do.

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## Endnotes

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i Under the all-inclusive concept, there is complete articulation of the income statement and balance sheet. All changes in equity other than owner investments are reported as income, which includes all recurring and non-recurring revenues, expenses, gains and losses, whether extraordinary or otherwise. While the current operating performance concept requires that only recurring items be reported as income and all other nonrecurring and extraordinary revenues, expenses, gains and losses be excluded from income.

ii Comprehensive income is the sum of net income and other comprehensive income components.

iii The use of the term 'surplus' was discontinued in 1941 upon the recommendation of the CAP and the term 'retained earnings' or some other title was recommended.

iv Prior period adjustments were omitted from income determination in ABP Opinion No. 9.

v Accounting Standards Update (ASU) No. 2011-05, Comprehensive Income (Topic 220): Presentation of Comprehensive Income, eliminates the reporting of comprehensive income in the statement of changes in equity (FASB, 2011). However, the option of a single statement of performance or two statements of performance is retained.

# COMPARATIVE ANALYSIS OF THE ACCURACY OF CREDIT RISK (DEFAULT PREDICTION) MODELLING USING DISCRIMINANT ANALYSIS AND LOGISTIC REGRESSION

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**Abstract.** Credit Risk is one of the major risks of banks and financial institutions. Subprime crisis of 2008, brought the focus back on credit risk management. Credit risk is measured with the help of credit ratings, collateral, loan amount & maturity of loan. Out of these factors credit rating is the primary measure of probability of default. Calculation of probability of default not only affects bankers' lending decision but also requirement of collateral, fixation of interest rate and other terms and conditions. Probability of default is calculated with the help of credit risk models or default prediction models. The objective of this study was to create default prediction models with the help various financial ratios that can predict and classify defaulters and non defaulters. For creation of model two most common multinomial classification techniques were used- Discriminant Analysis and Logistic Regression and their results were compared. 200 Indian Listed Companies (100 non-defaulting and 100 defaulting firms) were selected by stratified random sampling to construct the models. Another holdout sample of 100 Indian listed companies was chosen to validate the results. With the help of hit rate/ accuracy ratio, it was found that Logistic Regression gave better results and had better prediction power in original as well as hold out samples.

**Key words:** Credit Risk, Default Prediction, Discriminant analysis, Logistic Regression, Hit Rate.

## Introduction

Loans form an important component of a bank's portfolio. While granting loans, banks face credit risk, which is one of the major risks affecting banks and financial institutions. The Subprime Crisis of 2008 brought the focus back on credit risk management. Credit risk is measured with the help of credit ratings, collateral, loan exposure & maturity of loan. Out of these factors credit rating is the primary measure of probability of default. The probability of default refers to the possibility of the borrower not repaying its lenders. It is imperative for the lenders to discriminate the type of borrowers based on probability of default to decide whether to grant loan or not.

Probability of default is the outcome of default prediction models or subjective judgment of the lender. But accuracy of subjective judgement is dependent on evaluating person and difficult

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to scrutinize or repeat. Therefore subjective criteria become questionable many times. Therefore to quantify the risk, a number of default prediction models have been developed over the years to classify firms as defaulting or non-defaulting. Even international banking norms like Basel Norms have directed banks to create their own credit risk models for evaluating borrowers. This research paper was focused on creation of default prediction models by using two different techniques- Discriminant Analysis and Logistic Regression and comparison of the efficacy of the two models.

## Literature Review

Though the problem of judgement of creditworthiness is not new, the quantitative research on default prediction can be traced four decades back. With time, new methods and techniques have evolved, improvising on the existing ones or completely substituting them. The research in this field was initiated as univariate analysis which involved the use of accounting information. Ratio analysis is the one of the oldest form of univariate technique used by researchers. Beaver (1966) was among the first to make use of univariate analysis for bankruptcy prediction. Beaver (1966) found that cash flow based ratios were the most effective to discriminate between two samples of failed and non-failed companies. Despite the efficiency to discriminate, univariate analysis had certain inherent weaknesses. The impact of each variable had to be studied independently and there was a possibility of different ratios giving different predictions for the same firm leading to conflicting classifications. To overcome these drawbacks multivariate techniques replaced univariate methodologies. Altman (1968) developed a multivariate model for listed manufacturing firms using Discriminant Analysis. The model was popularly known as the Z-score model of bankruptcy prediction, which was a weighted combination of five ratios. It was one of the classical models, whose predicting power was highest with data closer to default. Similar studies were conducted by Deakin (1972) and Blum (1974) which reinforced the use of Discriminant Analysis for prediction of default. Deakin (1972) applied the dichotomous classification test and concluded that Discriminant Analysis could predict business failure as far as 3 years in advance with a fairly high accuracy. In 1977, Altman *et al* (1977) improvised on the Z-score model and named it as ZETA. This model was capable of classifying bankrupt firms up to five years before failure as they have taken average data for longer time span. Following Altman, many other researchers started applying Multiple Discriminant analysis in their studies. These included Ball and Foster (1981), Zavgren (1983) and Altman, Eom and Kim (1994) to name a few.

However, Discriminant Analysis has various pre conditions like normality of independent variables, equal covariance structure for discriminatory group etc. To avoid testing of theses diagnostics, other statistical techniques were used for development of default prediction model like **Logistic Regression** (Halperin et al (1971), Press and Wilson (1978), Ohlson (1980), Zavgren and Friedman (1988), Foster and Zurada (2013)); **Multidimensional Scaling** (Mar Molinero and Ezzamel (1991)); **Recursive Partitioning Analysis** (Marias, Patell and Wolfson (1984) and Frydman, Altman and Kao (1985) Wah Ho (1996)); **Hazard Model** (Shumway (2001), Hillegeist et al.,(2004), Beaver et al.(2005), Sun (2007), Agarwal and Taffler (2008)); and **Artificial Neural Networks** (Altman, Marco,Varetto (1994), Wilson and Sharda (1994/1995), Giles, Lawrence and Tsoi (2001),Kim (2006), Dixit, Roy and Uppal (2013)). Altman and Narayanan (1997) presented a summary of multivariate analysis studies conducted in

22 countries across the globe. They concluded that multiple discriminant analysis and logistic regression based on ratios were quite effective in predicting probability of default. Altman E I, Marco G and Varetto F (1994) compared the results of Multiple Discriminant Analysis and Artificial Neural Network (ANN). They found that apart from problems related to illogical weighing of indicators due to black box model, the model developed by ANN over fitted the original sample but the accuracy was not so high in holdout or different sample. Press S J and Wilson S (1978), Khatwani H, Arora M, Kumar P(2006) and Liong and Foo (2013) compared two most common techniques Discriminant Analysis and Logistic Regression and found that Logistic Regression was better because of non requirement of diagnostic constraints. On the other hand Press & Wilson (1978), Collins & Green(1982), Hamer (1983), Vuran B (2009) found that models constructed by Discriminant Analysis and Logistic Regression had same accuracy level. Muller, Steyn- Bruwer and Hammam (2009) considered various models for corporate failure. They judged the models by two factors overall accuracy ratio (Type I & Type II error) and Normalized Cost of Failure (NCF- Type I error). They considered NCF as the main error because of its consequences and the degree of its impact. They found that Logistic Regression and Neural Network techniques provided better overall predictive accuracy but Multiple Discriminant Analysis (MDA) and RPA had better NCF and prediction of defaulting companies leading to non lending to defaulters.

### *The Indian Experience*

Indian banks and financial institutions have been assessing the credit worthiness of a borrower on the basis of the borrower's financial statements, non financial information and site visits etc. Accounting ratios like coverage, liquidity, profitability and solvency were a few key ratios used to assess the financial risk of the borrowers. Gupta (1983) conducted a study on Indian companies that were financed by a private sector bank. His findings suggested that cash flow coverage ratios were better predictors of corporate sickness. Bhatia (1988) applied Multiple Discriminant Analysis on a sample of sick and non-sick companies as defined by Sick Industries Companies Act (SICA) and found that his model had significant ability to predict sickness. Similar results were obtained by Sahoo, Mishra and Soothpathy (1996), Choudhury, Sen (1999) in their study as well. Jayadev (2006) compared the predictive ability of three models. The first Z-score model related to the internal credit rating models of banks, the second used Altman's (1968) original Z-score model and the third was Altman, Hartzell and Peck's (1995) 'Emerging Market Score Model.' The results revealed that Altman's Z-score model was the most effective in discriminating between the default and non default companies and the model with factors considered by the banks in their internal ratings was the least effective. Bandyopadhyay (2006) employed Multiple Discriminant Analysis to develop a Z-score model and also used Logistic regression to predict probability of default. Bandyopadhyay found that his model using Multiple Discriminant Analysis was more suited in the Indian context as compared to Altman's original Z-score, Altman's Emerging Market's Model and the model developed using Logistic Regression. On the other hand, Khatwani, Arora and Kumar P (2006) compared results of Logistic Regression and Discriminant Analysis and found the Logistic Regression gave better results. Rao and Atmanathan (2013) did a comparative analysis of Altman's Z-score model (logit

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model) and KMV Merton Distance to Default Model by applying them to the Indian manufacturing sector. The results depicted that Altman's Z-score was able to predict bankruptcy more effectively as compared to KMV. So this research was focused on comparison of two major techniques of construction of default prediction models- Discriminant Analysis and Logistic Regression.

### Objective & Research Methodology

The objective of this paper was to develop default prediction models to discriminate defaulting companies from non-defaulting ones in Indian Scenario using Discriminant Analysis and Logistic Regression and to compare the accuracy of the two models. As discussed by Altman E I, Marco G and Varetto F(1994), Khatwani, Arora and Kumar P (2006), Muller, Steyn-Bruwer and Hammam (2009), Rao and Atmanathan (2013), Discriminant Analysis and Logistic Regression Models outperformed Moody's KMV and Artificial Neural Network. Multiple Discriminant Analysis (MDA) and Logistic regression have been the two most popular statistical techniques of bankruptcy prediction. In the light of the aforesaid views, this research paper had used both Discriminant Analysis and Logistic Regression to build and compare the efficiency of the two models. MDA is a technique used to classify an observation into one among several groups. It helps to identify the variables that best discriminate between the groups. The function attaches weight to each variable by estimating the coefficients. The individual variables are transferred to a single discriminant score called as the Z-score that helps to classify the observation into one of the several groups. The Z-score is therefore a weighted combination of ratios that best separates the groups. Therefore MDA has mostly been used to classify corporations under the default or non default, failed or non-failed and bankrupt or non bankrupt categories though it is capable of incorporating more than two classifications. While many of the studies using MDA showed a high classification power, it has certain constraints. It requires metric independent variables, which are normally distributed; linearity of relationship, zero or less multi-collinearity among independent variables and equal covariance structure for the discriminating groups along with sample size requirement. On the other hand, Logistic Regression relaxes some of the assumptions like normality of independent variables, equal covariance structure for the classified groups. Though Logistic Regression is similar to, Multiple Regression Analysis; it is based on Maximum Likelihood Function rather than Ordinary Least Square method. Due to binary dependent variable the log of the whole equation is considered and instead of probabilities it works on odds ratio. There were another set of researchers who by carrying out a comparative study on both the methods: Press & Wilson (1978), Collins & Green(1982) could not prove a higher classification accuracy of one technique. Hamer (1983) carried out a comparative analysis of both DA and Logit by using different data sets and found that both had an equal predictive power. Similar view was expressed by Vuran (2009) for a period of study of 2 years. Liong and Foo (2013) on the other hand found Logistic regression showed better results of classification, irrespective of the normalcy of the data. The mixed results necessitate further research, especially in the Indian context, to estimate the effectiveness of the two models.

The sample size for both the techniques was 100 defaulting and 100 non defaulting listed companies. The sampling technique was stratified random sampling. The data was taken from CMIE Prowess database. The non defaulting firms were randomly selected from NSE 200. Similarly 100 listed defaulted firms were selected randomly from Indian defaulted companies

disclosed by Indian Credit Rating Agencies in their mandatory SEBI disclosure of defaulters in the year 2012-13 (population 305). To avoid high effect of data before default, the average of five years financial ratios were considered. The time frame for the study was 2008 to 2013. Due to differences in nature of income, expenses, asset and liability structure of Banking & Financial companies as compared to other companies; this sector was deliberately excluded. The range of asset sizes of selected companies was Rs 10 billion to Rs 500 billion and their average asset size was Rs. 188.99 billion. To develop the models, following company related financial ratios were chosen: Sales Growth Rate, Proprietor's Ratio, Interest Coverage Ratio, Current Ratio, Cash Ratio, Net Profit Margin, Operating Profit Margin, Operating Cash Flow Margin, and Interest Coverage Ratio based on Operating Cash Flow, Asset Turnover Ratio, Earning per Share (EPS), Market Price/ Book Value of share. These independent variables were selected based on their popularity in literature and their degree of significance.

Before the application of Discriminant Analysis, normality of distribution of independent variables was checked by Kolmogorov Smirnov Test, Multi Collinearity by Correlation Matrix and VIF and Equality of Covariance Structure by Box's M. For checking the significance of the model developed by Discriminant Analysis- Chi Square test, F Value and Wilk's lambda were calculated. The accuracy was checked with the help of hit ratio/ accuracy ratio. A holdout sample of 100 firms was selected to cross validate the findings. With Logistic Regression, Nagelkerke's pseudo  $R^2$ , Wald Statistic and Chi Square test were calculated. Hit ratio was used to check the accuracy and validity of the model. In both the techniques of default prediction only two outcomes- default and non-default were considered. The default was coded as zero and non default as one. All the independent variables were financial ratios therefore metric and no qualitative variables were considered as MDA cannot handle qualitative or nominal variable. This was a limitation of the study that it predicted only binary outcomes based on quantitative data instead of predicting a range of probabilities with the help of financial as well as qualitative data.

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## Findings & Analysis

Before making the model the assumptions of Discriminant Analysis were verified by diagnostic tests. With the help of Kolmogorov-Smirnov test the normality of independent variables was checked and it was found that all the independent variables were normally distributed (Table 1).

Table 1: Descriptive Statistics of independent variables and checking of Normality of distributions of independent variables using Kolmogorov-Smirnov Test

The Independent variable	N	Normal Parameters		Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
		Mean	Std. Deviation		
Net Profit Margin	200	0.05	0.21	2.69	0.00
Proprietors ratio	200	0.03	5.17	6.74	0.00
Current Ratio	200	2.06	2.13	3.15	0.00
Earnings Per Share	200	23.2	71.7	4.14	0.00
Price to Book Value	200	3.16	5.18	3.59	0.00
Cash Ratio	200	0.38	0.74	4.31	0.00
Interest Coverage Ratio based on Operating Cash Flow	200	103.56	415.79	5.48	0.00
Asset Turnover Ratio	200	0.9	0.57	1.8	0.00
Revenue Growth Rate	200	0.55	1.41	5.35	0.00
Contingent Liability over total assets	200	0.2	0.35	4	0.00
Interest Coverage Ratio	200	216.19	1020	5.83	0.00

Further, to check for the equality of covariance structure of two groups, Box's M test was conducted and null hypothesis of equality of covariance structure was not rejected with the help of Chi Square test ( $p=0.56$ ). Therefore two major conditions/ diagnostics for application of Discriminant Analysis were satisfied. Apart from these two pre conditions, to check the effect of multi collinearity, VIF & correlation matrix was studied. It was found out that Interest Coverage ratio and Interest Coverage Ratio based on Operating Cash flow (.974) were highly correlated. Therefore, considering the correlations, it was decided to select one representative from the pair. To remove one variable from the pair, two methods were used- logistic regression with backward stepwise method and t statistics (along with Levene's Test) for testing the differences in means of independent variables of defaulted and non defaulted companies. The summary of t statistics is escribed in Table 2 below

Table 2: Descriptive Statistics and t Value

	Default Status	Mean	Std. Deviation	t	Sig. (2-tailed)
Net Profit Margin	Defaulted	-0.04	0.25	-6.736	0.000
	Non Defaulted	0.14	0.10		
Proprietors ratio	Defaulted	-0.44	7.30	-1.304	0.194
	Non Defaulted	0.51	0.15		
Current Ratio	Defaulted	2.79	2.67	5.16	0.000
	Non Defaulted	1.33	0.94		
Price to Book Value	Defaulted	1.61	5.48	-4.412	0.000
	Non Defaulted	4.70	4.37		
Cash Ratio	Defaulted	0.34	0.57	-0.814	0.417
	Non Defaulted	0.43	0.88		
Interest Coverage Ratio based on Operating Cash Flow	Defaulted	0.27	3.77	-3.618	0.000
	Non Defaulted	207.00	570.91		
Asset Turnover Ratio	Defaulted	0.79	0.47	-2.782	0.006
	Non Defaulted	1.01	0.63		
Revenue Growth Rate	Defaulted	0.16	0.23	-4.062	0.000
	Non Defaulted	0.94	1.91		
Contingent Liability over total assets	Defaulted	0.21	0.43	0.174	0.862
	Non Defaulted	0.20	0.25		
Interest Coverage Ratio	Defaulted	0.91	2.50	-3.055	0.003
	Non Defaulted	431.00	1410.00		

With t statistics, it was found out that Contingent Liability to Total Assets Ratio, Cash Ratio and Proprietors Ratio were not so significant. Based on t values, if a choice had to be made between Interest Coverage Ratio based on Operating Cash Flow and Interest Coverage Ratio- Interest Coverage Ratio based on Operating Cash Flow was better. Based on their significance level, the final ratios that were selected as independent variables included: Current Ratio, Net Profit

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Margin, Interest Coverage based on Operating Cash Flow, Asset Turnover, Revenue Growth Rate and Price to Book Value of shares.

## *Results of Discriminant Analysis*

Based on selected ratios of 100 defaulting and 100 non defaulting firms, discriminant analysis was applied to build the model. The result of classification was the following:

Table 3: Coefficients of Discriminant Analysis

	Fisher’s Classification Function Coefficients		Standardized Canonical Discriminant Function Coefficients
	Default Status		
	Default	Non Default	
Net Profit Margin	-0.312	5.353	0.653
Interest Coverage Ratio based on Operating Cash Flow	7.55E-05	0.001	0.244
Asset Turnover Ratio	2.611	3.548	0.319
Current Ratio	0.723	0.335	-0.475
Revenue Growth Rate	0.141	0.655	0.426
Price to Book Value	0.025	0.116	0.275
(Constant)	-2.777	-3.778	

The Standardized Discriminant Function Coefficients suggested that Net Profit Margin was one of the major classifying variables. The Z score was constructed based on difference between classification function of non-defaulting firms and defaulting firms was following:

$$Z = Z_{ND} - Z_D$$

$$Z = -1.001 + 5.665 \text{ Net Profit Margin} + 0.0009245 \text{ Interest Coverage Ratio based on operating Cash Flow} + 0.937 \text{ Asset Turnover Ratio} - 0.388 \text{ Current Ratio} + 0.514 \text{ Revenue Growth Rate} + 0.091 \text{ Price to Book Value}$$

The group centroid of Z value for non-defaulters was 0.818 and for defaulters was -0.818. As both the groups had same sample size of 100, the cut off value was zero. A positive Z score depicted non defaulter and a negative Z score depicted defaulter. For overall model, F statistics (64.06), Wilk's Lambda (0.597) and Chi Square (100.601 at df=6) were calculated and found that the model was significant ( $p < 0.001$ ). The accuracy of prediction was 91% for original group and 90% for hold out sample.

Table 4: Classification Results: Original Sample

	Default Status	Predicted Group Membership		Total	Overall Accuracy
		Defaulted	Non Defaulted		
Observed	Defaulted	91	9	100	91%
	Non Defaulted	9	91	100	

On the hold out sample of 100 firms, the Z Score was applied to validate the model. It was found out that accuracy ratio was 90%.

Table 5: Classification Results: Holdout Sample

		Predicted Group Membership			Overall Accuracy
		Default	Non Default	Total	
Observed	Default	45	5	50	90%
	Non Default	5	45	50	

### *Results of Logistic Regression*

Unlike Discriminant Analysis, Logistic Regression does not require normality of independent variables and equality of covariance structure of two groups; however as any other multivariate technique, lack of multi collinearity gives better results. So by taking similar independent variables - Current Ratio, Net Profit Margin, Interest Coverage Ratio based on Operating Cash Flow, Asset Turnover Ratio, Revenue Growth Rate and Price to Book Value of Shares of 100 defaulting and 100 non defaulting firms; a model was constructed. The Omnibus Chi Square Test was 228.81 (df=6), showing high significance of the model ( $p < 0.001$ ). Nagelkerke's pseudo R Square was 0.909 showing high predictive capability of model.

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Table 6: Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Current Ratio (CR)	-1.711	0.671	8.342	1	0.003	0.181
Net Profit Margin (NPM)	36.744	10.93	11.302	1	0.001	9.07E+15
Interest Coverage Ratio based on Operating Cash Flow (IC)	0.323	0.11	8.569	1	0.003	1.381
Asset Turnover Ratio (ATR)	1.998	0.649	9.464	1	0.002	7.372
Revenue Growth Rate (RGR)	2.721	1.393	3.812	1	0.050	15.188
Price to Book Value (PBV)	0.155	0.07	4.833	1	0.028	1.167
Constant	-4.472	1.24	12.999	1	0.000	0.011

In Logistic regression also Net Profit Margin came out as one of the major factors followed by others like Asset Turnover Ratio, Interest Coverage Ratio based on Operating Cashflow etc. The model built with the help of Logistic Regression Analysis to predict odds ratio for non default, probability of non default (PND) and probability of default (PD), was

$$\text{Odds Ratio (for Non Default)} = \frac{PND}{1-PND} = \frac{PND}{PD}$$

$$\text{Odds Ratio} = e^{-4.472-1.711 \text{ CR} + 36.744 \text{ NPM} + 0.323 \text{ IC} + 1.998 \text{ ATR} + 2.721 \text{ RGR} + 0.155 \text{ PBV}}$$

or

$$\begin{aligned} \ln(\text{Odds Ratio}) &= \ln\left(\frac{PND}{1-PND}\right) = \\ &= -4.472 + 36.744 \text{ NPM} - 1.711 \text{ CR} + 0.323 \text{ IC} + 1.998 \text{ ATR} + 2.721 \text{ RGR} + 0.155 \text{ PBV} \end{aligned}$$

At cut off value of 0.5, the overall accuracy ratio came out to be 95.5% with predicting 96% defaults correctly. The following Classification Matrix displayed the accuracy ratio of model using logistic regression in the original sample:

Table 7: Classification Table: Original Sample

Observed Default Status	Predicted Default Status			Percentage Correct
		Defaulted	Non Defaulted	
	Defaulted	96	4	96
	Non Defaulted	5	95	95
	Overall Percentage			95.5

To validate the model, the model was applied on the hold out sample also. The accuracy ratio to predict default came out to be 94%, which was higher than discriminant analysis (90%)

Table 8: Classification Results: Holdout Sample

	Predicted Group Membership			Overall Accuracy
		Default	Non Default	
Observed	Default	47	3	94%
	Non Default	3	47	
			Total	
			50	
			50	

This study suggested that Logistic Regression Model (95.5%) had a better predictive power than Multiple Discriminant Analysis (91%). The more critical type I error was also lesser in Logistic Regression, as it was able to predict 96% defaults correctly in comparison to Multiple Discriminant Analysis (91%). These findings supported Press and Wilson (1978) and Ohlson (1980), who preferred Logistic Regression due to constraints and assumptions of Multiple Discriminant Analysis. It also supported the findings of Muller, Steyn- Bruwer and Hammam (2009), who had stated overall accuracy ratio of Logistic Regression was better than Multiple Discriminatory Analysis. But it contradicts their findings that type I error of predicting defaulters correctly was lesser in Multiple Discriminant Analysis than Logistic Regression. The study also contradicted the findings of Vuran (2009), who said that there was no difference in the classifying power of two techniques. The study supported recent finding of Liong and Foo (2013), who stated that Logistic Regression gives better results than Multiple Discriminant Analysis irrespective of asset sizes, sample sizes and type of distribution. This study concluded that even if the pre conditions of Discriminant Analysis were met, Logistic Regression gave better result.

The significant classifying independent variables came out from the study were Net Profit Margin, Interest Coverage Ratio based on operating Cash Flow, Current Ratio, Asset Turnover, Revenue Growth rate and Price to Book Value of shares. Net profit margin focuses on profitability of the firm, interest coverage ratio on operating cash flow depicts financial fixed charge paying capacity of the firm from its operating cash flows, asset turnover focuses on efficiency of the firm, revenue growth rate focuses on growth of company's operations and price to book value of share focuses on the relative performance of the company on the stock exchange.

The results of this research suggested that logistic regression model was found to be more accurate even when the independent variables were metric, normally distributed and covariance structures of the observed groups were similar. Therefore, the model built with the help of logistic regression can be used by bankers while lending to judge the credit worthiness of their borrowers.

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## SOCIAL INVESTMENTS AS DRIVING FORCES OF SOCIAL CHANGES IN SLOVAKIA

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**Abstract.** *The paper will be focused on the problems connected to those topics, specifically from the point of view of social enterprises in Slovakia. We will use an analysis with the objective to identify the weaknesses and the sources of ineffectiveness of existing social enterprises and also to make some proposals how to eliminate the main sources of this status. The most influential impulse for starting the social investments in Slovakia were the changes after 1989, when new business possibilities were opened under the free market' conditions and the potential participation on the public affairs for everyone. First failures came in 2009 when social enterprises were created with the objective to increase the employment of people with disabilities. Unfortunately, from eight pilot social enterprises established in that time, prosecution was launched on four of them for misuse of subsidies and misunderstanding of concept of social entrepreneurship.*

**Key words:** *single market, European Union, social enterprises, weakness, strengthening, investments*

**JEL clarification:** *D69, E22, H54*

### Introduction

At its most basic definition, finance is the act off allocating capital to individuals and businesses that want to make productive use out of it. In short, finance creates also social value. Finance today takes on a wholly different and, some would argue, less socially-conscious meaning. Sustainable finance is the practice of creating economic and social value through financial models, products and markets that are sustainable over time. Strengthen communities in need and broaden economic opportunity by developing new ways to leverage our capital markets expertise.

The social and economic impacts of social service organizations are often given little attention to the traditional economic theory and applied economics. Policymakers frequently regard the role of social enterprises as ancillary to the economic well-being of local communities, choosing instead to focus the majority of their time and attention on analyzing the growth potential of the for-profit sector. This fundamental break occurs because social enterprises serve a distinctly different purpose than profit-maximizing firms, and their success is not as visible or easy to measure as the magnitude of a profit margin.

Quality social enterprises create benefits to the society by addressing social problems, and virtually all the social benefits they create, have monetary or economic value that can be identified and measured. A social service organization that calculates this value can leverage

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its success into more effective fundraising, revenue generation, pay-for-performance relationships, and better ways of capitalizing growth.

A social enterprise creates economic value when it increases revenue or eliminates costs, or both, for stakeholders. These benefits typically accrue over time. The three components—increased revenue, decreased cost, and time—hold true whether the organization operates as a for-profit or a nonprofit. When analyzing policy, it is good practice to carry out a stakeholder analysis to determine who is affected, and to what extent. For any policy issue, the potential range of stakeholders is vast. For multi-dimensional policy issues such as poverty and social inclusion, the range is even greater.

Not all potential stakeholders will be relevant actors for all issues, or at all levels of policy-making and phases of the policy cycle. Social enterprises are focused on creating public value. Public value can be described as ‘what adds value to the public’ and ‘what is valued by the public’. This interpretation leaves social service organizations with a problem. Due to the fact that these organizations are confronted with a complex multi-stakeholder environment, it is important to assess for which stakeholders the organizations should create public value, and what public value exactly means to the different stakeholders. This assessment is important because stakeholders determine whether a public organization is operating legitimately. When an organization is not operating in a legitimate way, stakeholders may withdraw their support, there with threatening the autonomy or continuity of the social enterprises.

### **Social enterprises and social entrepreneurs**

Social enterprises seek to serve the community’s interest (social, societal, environmental objectives) rather than profit maximisation. They often have an innovative nature, through the goods or services they offer, and through the organisation or production methods they resort to. They often employ society’s most fragile members (socially excluded persons). They thus contribute to social cohesion, employment and the reduction of inequalities. The European Commission wants to contribute to the creation of a favourable environment for the development of social business in Europe, and of the social economy at large. Also for Slovakia it means a chance for new begin of social entrepreneurial businesses.

Social enterprises are positioned between the traditional private and public sectors. Although there is no universally accepted definition of a social enterprise, their key distinguishing characteristics are the social and societal purpose combined with an entrepreneurial spirit of the private sector. Social enterprises devote their activities and reinvest their surpluses to achieving a wider social or community objective either in their members’ or a wider interest.

Nicholls has defined social entrepreneurs as follows: social entrepreneurs and their networks demonstrate an unrelenting focus on systemic social change that disregards institutional and organizational norms and boundaries. These disruptive change-agents are often sectoral iconoclasts operating in a more diverse and dynamic strategic landscape than conventional businesses or social ventures. Whilst aiming never to compromise social mission, social entrepreneurs will look for alliances and sources of resources wherever they may be found most easily. Thus many engage simultaneously with government, philanthropic institutions, the voluntary sector, and banks, as well as the commercial market to secure funding and other support where necessary. Similarly, social entrepreneurs will often exploit a range of organizational forms – often-unique hybrids-from charity to not-for-profit to commercial venture to maximize social value creation. Social entrepreneurs also move easily across sectors.

## **Social entrepreneurship in Slovakia**

In Slovakia, for the purpose of the law about services of employment, social enterprise is a legal entity or a physical entity that:

1. employs employees, who, before the admission to the new employment were disadvantaged applicants for employment in the meaning of the law about services of employment in the number that is less than 30% of the total number of its employees.
2. provides support and help to employees, who before the admission to employment were disadvantaged applicants for employment in finding employment in the open labour market.
3. at least 30% of finances gained from the income from the performances that will remain after paying all costs of the performances for the corresponding tax period according to tax declaration. These finances will be used for creation of new working positions or improvement of working conditions every year.
4. is registered in the social enterprises registry.

The founder of social enterprise can be: legal entity or physical entity, town, county, association of towns, association of counties according to the special regulation, budget organization or contributory organization whose founder is town or county.

Slovakia has a huge network of social services and providers of social goods. Providers are governmental organizations; non-profit and non-governmental organizations; charities and diaconal organizations; private and for-profit organizations. The space for social entrepreneurship and social enterprises is inside country because public or private sector has failed. In many cases, these can be considered as failures in the social market of public goods. The system of distributing social goods and answering on social needs in our country is not working correctly. Reasons should be various. Dysfunctional independence between providers and the financial sources for serving services is the strongest reason together with lack of innovations and growing quality. The opportunity for sustainability of social investing has several motivations in environmental, social and responsible investing strategy. Strategy was first and biggest misunderstanding in the first package of social enterprises establishing around the Slovakia, which failed in 2009. During this period of few years was creating 10 social enterprises with basic aim in employment of disadvantages group of people on labour market. From these 10 enterprises was 8 bankrupt till 2 years from establishing. They spent funded money from European Social Fund and Slovak government with big failure in the strategies and future development plans.

Slovakia today has second huge chance for establishing new social enterprises and for using social investments for empowering the social services in the country. But at first, the priority of the Slovak government still valid up today, namely to endorse social services established by municipalities and their bodies only, must be changed. Because, to the basic pillars for development of social entrepreneurship in the terms of Slovakia belongs also:

- active third sector,
- public policy,
- support and funds from the European Commission,
- new legislation.

Especially, active third sector is now very strong driving force for development of social enterprises in Slovakia. For example, until the end of March 2014, 43 social enterprises were registered. Most of them are established with the common objective – to employ people who

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are unemployable, namely people after 50, people with soft physical disabilities and people which are unemployed longer than 5 years.

The register of providers by the Statistical Office of the Slovak Republic has indicated the number of social care providers in Slovakia as follows: 1269 social services providers by facilities, 535 facilities by government or municipalities' providers and 734 NGOs and NPOs providers which are established by churches, foundations, free lancers and another legal person. These providers are able to provide social services for more than 480 000 person by their capacity of facilities. From this number, more than 154 500 places are in care of NGOs and NPOs. The total receipts for social services providers in this year were more than 370 million EUR and little more than 85 million EUR were granted for non-profit and non-governmental providers of social care services.

These numbers and increasing trends in the establishing of the social enterprises for reintegrated people to the labor market and providing the social services in this non-profit way is the "light on the end of tube" for the establishing the relevant policy and law system for functioning social entrepreneurial system in Slovakia.

The history and the development of this type of organizations is not the same in every country. It is important to give some background about the Slovak social service providers in order to fully understand our research. Until the 1990's many organizations are nowadays called social service providers were part of national, regional or local government. Central government was convinced that liberalizing these social enterprises would enhance efficiency and effectiveness.

After the liberalization, different types of social providers emerged very quickly in Slovakia. Some organizations became private organizations with public goals, other organizations stayed governmental. Sometimes this division changed over time. At this moment some organizations are still governmental, while others are more or less private. Like in other countries one can identify in Slovakia a number of very similar characteristics:

- The main objective is not power or profit but the delivery of goods and services to fulfill a social value which is perceived and legitimized by its stakeholders.
- The financing of operations and financial position are a precondition to achieve the objectives.
- The revenues come from various sources of funding.
- Social service providers must be accountable to their stakeholders. Accountability guidelines are defined per sector (e.g. healthcare, education, charity).
- It is striking that these guidelines often include the interaction with stakeholders.

### *EU perspective and single market*

The perspective of social enterprises should be more flexible and creative. The new visions of the aim of establishing the social enterprises are more variable. The European Commission in the Horizon 2020 established Social Entrepreneurship Funds under the Investments Funds as one of initiative for announced in the Single Market Act work to explore how private investment funds might help. This includes ensuring there are no unintended barriers within EU fund rules to the efficient channelling of investments to social businesses. Slovakia will take the chance to create new legislation and establish new social enterprises under the rules of EU on the national and cross-border basis.

The single market consisting of number of nations, especially those of the European Union, in which goods, capital and currencies can move freely across border without tariffs or restrictions; this should be the way for health competition in the social entrepreneurial sector.

In the perspective of Horizon 2020, the social enterprises look like combination of:

- Leadership: social enterprises will increasingly be led and shaped by grassroots entrepreneurs, not funders and policy makers;
- Investment: social investment will grow beyond the sector in a global hunt for a blended return from anyone ready to deliver it;
- Uncertainty: as the ideas and practices of social enterprise are adopted by other sectors, will there actually be room for a social enterprise sector?
- Connected: social enterprise will connect and spread in the way for-profit business has, taking democracy global in a way governments have not;
- Growth: social enterprise will achieve scale through networks, replication, franchising, growing locally and spreading geographically;
- Definition: social enterprise will to define, not by what makes it different, but by the difference it makes in the world;
- Impact: social enterprise will no longer be seen as a mid-point between business and charity but judged alongside them for its demonstrable impact;
- Influence: social enterprise will be Europe's Research and Development lab for social problems, transforming the practice of government, charities and for-profit businesses.

From the point of view of social enterprises in Slovakia we will use an analysis with the objective to identify the weaknesses and the sources of ineffectiveness of existing social enterprises and also to make some proposals how to eliminate the main sources of this status. We decided the method of measurement as the most relevant for the defined weaknesses and strengths of the existing social enterprises in Slovakia.

The UK's Research Excellence Framework (REF) defines impact as "reach" and "significance" and can encompass the "effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life. The UPN has a key definition of impact measurement and in this, impact is the overall difference an organization, program or intervention makes. Impact makes broader or longer-term effects of a project or organization's activities, outputs and outcomes. It is also used as a calculation of net benefit once an allowance is made for what would have happened anyway.

#### *Impact measurement of social services*

Impact measurement is the set of practice through which an organization establishes what difference its work makes. The initial focus of impact measurement of social services was in the late 19<sup>th</sup> century on measuring need, such as how many people live in poverty. However, after the introduction of the welfare state, the role of the social and voluntary sector became more geared towards providing innovation and personal attention in contrast to the bureaucracy and inflexibility of the public sector. This, in the eyes of some, made a degree of inefficiency legitimate. Noting that the focus of measurement in the social service providers sector "waxes and wanes", Barman argues that the use of measurement is not neutral or objective.

For measurement to be effective it must be:

- relevant: related to, and rise from the outcomes of measuring;
- helpful: in meeting the needs of stakeholders, both internal and external;
- simple: both in how measurement is made, and in how it is presented;
- natural: arising from the normal flow of activity to outcomes;
- certain: both in how it is derived, and in how it is presented;
- understood and accepted: by all relevant stakeholders;

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- transparent and well-explained: so that the method by which the measurement is made, and how that relates to the services and outcomes concerned are clear;
- established on evidence: so that it can be tested, validated, and from the grounds for continuous improvement.

In some cases also serve as a useful set of foundation principles for social impact measurement to other indicators. They:

- involve stakeholders,
- understand different changes,
- value the things that matter to stakeholders,
- only include what is material (that makes a difference to stakeholders' view),
- do not over-claim,
- be transparent (explain clearly how you found the answer, and any nay uncertainties your evidence or assumptions),
- verify the results (based on good research principles).

Approaches of measurement such as "Social Return Investment" or "Social Accounting" might lead to better comparability, by estimating the economic value of the social impact. However, with an increased involvement of private finance there is a risk of monetization of service outcomes, which could result in a "creaming" effect, whereby services for the most vulnerable might be discontinued in favour of projects that lead to higher success rates. We should say also, that government is responsible for the well-being of its people and for guaranteeing access to social and health care. Governments are not only investors, but they have a moral responsibility towards their citizens. A free market would not guarantee access to services for all; often those with the least financial means have the most need and life risk such as unemployed who are often structural rather than individual. Public responsibility and therefore public financial commitment is necessary at all levels of government to ensure access for all to social services and those service providers that are able to provide quality services.

Although it is important to collect evidence, so as to inform action, the face-value should not be taken. There is a risk measurement that becomes an aim in itself, whereas it should, rather be seen as a mean to achieve desired social outcomes. Human behavior is usually unpredictable, and so, with social impact investment, there should be room for failure of given social services calculation, where money is then diverted, but rather, be seen as a way to figure out how a given service can be improved.

### *Results of measurement*

There cannot be a single methodology or set in indicator to measure social impact of social enterprises because of the diversity of the organizations people work with and the contexts within they work. In addition, any measurement framework should be proportionate to the capacity of the organization and to usefulness of the measurement generated, in terms of time needed to implement and report impact using framework.

From the perspective of this measurement's method we should conclude, that the weaknesses of the Slovak social enterprises are:

- low status for social services;
- misunderstandings of concept of social enterprises;
- non-correct clarification of law system for social entrepreneurship;
- close "typical" bank system not open for social investments;

- corruption;
- no tax exemptions or privileges;
- absent specified subsidies;
- non-existing crowdfunding system;
- instability of social system;
- growing poverty;
- lack of knowledge and experiences in the social entrepreneurship.

On the other hand, strengthens should be relevant in the perspective of measurement method as a:

- crossroads of the private, public and third sector;
- concept of social enterprises is still in process of innovations;
- system of (re)-integration of disadvantaged persons into to labor market;
- community participation on social life of society;
- recalls for the necessity of social enterprises;
- active third sector;
- active policy of employment on the local and governmental level.

## Conclusion

From this measurement perspective it is relevant to say that the system of the social entrepreneurship and networking in this field must be changed in Slovakia. The advantages for the innovative perspective should be, for example, the open single market on the international level; changing bureaucracy and juridical system; establishing the functioning of social providers network; and the last but not least, changing understanding of the society in the sharing the social needs and goods.

Social investment is about investing into people. It means policies designed to strengthen human skills and capacities and support them to participate fully in employment and social life. Challenges in these investments which are facing enormous phenomenon in Europe are unemployment and poverty increasing as a consequence of economic crisis and demographic changes facing in the increasing disproportion of older people and working-age population. The biggest opportunity for social investing seek to strengthen peoples' current and future capacities and improve their opportunities to participate in society and the labour market, and, of course, calls for investing into children and youth to increase their opportunities in life. Each of this opportunity for social investing needs at first changing of society in the meaning of social innovations and providing social services. They may actively seek out investments – such as community development loan funds or clean tech portfolios – that are likely to provide important societal or environmental benefits.

Whenever social innovations manifest themselves in social practices, in the diction of action theory, it follows that they either lead to new forms of social action or presuppose new social action. At any rate, social innovations are expressed in a new definition (dimension or direction) of what constitutes the meaning of action and its relation to others (to the social environment). On the other hand, a recasting of these very roles and functions can change social systems themselves, under circumstances affecting general processes of social change. The latter depends on the form and “range” of concrete innovations.

All innovations are socially relevant, both those with objectives and rationality criteria to change economic parameters and those with social intensions and effects in the field of social practices. But this also implies that, irrespective of what kind of innovation is to be developed,

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realized or examined, the meanings and effects of innovations do not remain restricted to the respectively evident functional system: technological and economic innovations affect or change not only the functional system of the economy, but also the other major functional systems as politics, law and culture. It equally applies that social innovations by no means exert an influence only on culture or politics, but also on the functional systems of law and the economy. Within this system, the functional area of integration has major importance for maintaining the system, but at the same time also for change.

*“The most urgent and important innovation advance in the 21<sup>st</sup> century will take place in the social field. Technical innovations will continue, of course, and bring about a materially and immaterially utterly changed environment and new living conditions in comparison with previous possibilities; but the social innovations will be those that the inhabitants of the world must first produce or ensure” [Hochgerner 1999].*

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## **LAW, POLITICS, AND CAPITAL ALLOCATION: INTERNATIONAL EVIDENCE FROM THE STRUCTURAL INVESTMENT MODEL**

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**Abstract:** *In this paper, we assess which approach -legal or political- better explains differences in firms' financing constraints. While many scholars recognize the importance of country institutions in shaping efficient capital markets, there is considerable disagreement on which institutional factors are most important. We find evidence that both political and legal factors are relevant in explaining financing constraints. We also provide evidence on channels through which specific institutions may affect capital allocation. Our results indicate that common law origin and strong public enforcement improve access to finance. Furthermore, we show that high levels of press freedom, less restrictions on investment and low levels of corruption help alleviate firm's financing constraints. Our findings are robust to many aspects of our methodology and to self-selection bias related to the choice of covering a firm (financial analysts' coverage) and cross-listing on US markets.*

**Keywords:** *Financing constraints, financial hierarchy, legal system, political institutions, Investment-cash flow sensitivity*

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## Introduction

Researchers have long been interested in studying factors that help capital markets better perform their function. According to Tobin (1982) and Stulz (2009), stock markets perform a vital economic role when they allow efficient capital allocation. This research examines the impact of country political and legal institutions on capital allocation. In the literature, country institutions have been considered as relevant factors that shape financial and economic development. However, there is an ongoing and intense debate on which institutions are most important. One point of view argues that legal institutions create incentives that influence the behavior of corporate managers and investors (e.g. La Porta et al. 1997, 1998 and 2006). Such incentives may impact the protection of investors' rights and therefore the ability of firms to fund their projects. Consistent with this argument, several empirical papers show that differences in legal institutions help explain cross-country differences in corporate valuations (La Porta et al. 2002); firm's growth (Demirguc-Kunt and Maksimovic, 1998); and the cost of debt (Qi et al. 2010). The other point of view advocates the importance of political factors. For instance, Roe and Siegel (2011) argue that investors' protection is a policy choice. Hence, some academics consider political institutions as an important determinant of financial development. In more recent studies, there is mounting evidence supporting the political economy view (e.g. Qi et al. 2010; Roe and Siegel, 2011).

This paper is motivated by the "the legal versus political view" debate. As stressed by Roe (2006, p.463): "There is a powerful normative reason to get this assessment right. Many policymakers and some academics see strong financial markets as propelling economic development. Thus, if we better understand what makes for strong financial markets, we can better understand how to engineer economic growth, or at least how to provide a necessary tool". In fact, we argue that understanding which specific institutions help alleviate firm's financing constraints is relevant to policy makers since the presence of such constraints limits investment opportunities, firm's profitability and ultimately impedes economic growth. Channels examined in our tests include legal origin, private enforcement, public enforcement, corruption, investment freedom and press freedom. Our emphasis on these institutional factors both complements and extends the existing literature. We investigate (i) the separate and joint impact of political and legal factors on firm's financing constraints, and (ii) whether political institutions are important in explaining capital constraints after controlling for legal factors. To proxy for firm's financing constraints, we measure the sensitivity of investment to internal capital (Fazzari et al. 1988). We interpret high investment-cash flow sensitivity as evidence that firms are facing binding financial constraints.

Our results imply that common law origin, strong public enforcement, low corruption and fewer restrictions on investment help relax firm's financing constraints. Furthermore, consistent with Qi et al. (2010), our findings also suggest that a rich information environment (e.g. greater press freedom) plays an important role in improving firm's ability to fund investment projects. One important policy implication of our findings is that tackling financing constraints should not be limited to actions intended to improve the supply of credit (e.g. low interest rates), but may also include

policies that promote transparency, trade openness and strong judicial systems. Such policies should increase investors' expected gains from litigation and minimize the additional risks and costs imposed by corruption and asymmetric information.

Our contribution to the literature is twofold. First, we propose a new test that examines the impact of political factors on corporate investment. To our best knowledge, our research is the first analysis that investigates the potential association between political institutions and the investment-cash flow sensitivity. The papers that are close in spirit and methodology to our work are Love (2003) and Qi et al. (2010). Love (2003) finds negative relations between the quality of the legal environment and the sensitivity of investment to the availability of internal capital. While Love (2003) research is innovative, political factors are not covered in her study. In our tests, we try to address this deficiency in the literature and contribute to a better understanding of how political factors impact capital allocation. In the same vein, Qi et al. (2010) show that high creditors rights and strong political institutions are related to low bond spreads and high credit ratings. Although both papers findings clearly support the large consensus in favor of the presence of a positive relation between the quality of legal institutions and access to finance, we still know little about what channels make a legal system more efficient (e.g. public or private enforcement aspects of securities laws). For instance, Qi et al. (2010) measure the effectiveness of the legal system using only a creditor rights index (private enforcement proxy). Further, Love (2003) investigates the separate impact of several legal indicators but not the joint impact. Hence, our second contribution is to control for the separate and joint impact of different legal factors on firm's financing constraints. The purpose is to determine specific channels that are relevant to reforming legal institutions. We then disaggregate national laws into three distinct dimensions: legal origin, private enforcement, and public enforcement. We argue that it is important to examine the joint impact of the three legal dimensions. In support of this argument, we find that private enforcement aspects become non significant in a joint analysis, suggesting that results based on one of these factors could be misleading.

The rest of the paper is organized as follows: Section 2 presents an overview of the literature and discusses the theoretical framework. Section 3 details the empirical methodology and testable hypotheses. Section 4 provides a brief description of the data and summary statistics. Section 5 presents the main results. Section 6 concludes.

## **Literature review and conceptual framework**

Our research relates to an ongoing debate about which approach –legal or political economy- better explains the performance of different capital markets. One stream of research suggests that differences in legal institutions are important to explaining variations in financial development around the world (e.g. Laporta et al. 1998; Djankov et al. 2008; Stulz, 2009). Another strand of research recognizes that political rights are key determinants of financial development (e.g. Rajan and Zingales, 2003; Roe, 2006; Roe and Siegel, 2011). Although there are good economic reasons why both factors can play an important role in improving capital allocation, it is not obvious whether the legal

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approach dominates the political approach or both approaches are complement. We conjecture that answers to these questions are an empirical issue.

### *Legal institutions and firm's financing constraints*

A country legal system can affect firm's financing constraints for many reasons. According to Stulz (2009, p.353): "securities laws can affect the cost of trading for investors, their information acquisition costs, the precision of their estimates of the distribution of returns and the stocks they know". Stulz (2009) shows that weak national regulations increase agency and information acquisition costs. In the same line of reasoning, Chinn and Ito (2006) consider that incentives for loan activities can be limited in countries where legal regimes do not clearly define property rights and guarantee the enforcement of contracts. Furthermore, we argue that legal factors can also influence firm's disclosure policies. For instance, in countries where disclosure laws are more extensive and more strictly enforced, we should expect firms to provide high levels of disclosure. The latter should reduce information asymmetries between market participants and ultimately lower firm's cost of capital (Diamond and Verrecchia, 1991; Leuz and Verrecchia, 2000; Verrecchia, 2001). A related argument is that increased levels of disclosure should broaden firm's investors' base because investors are more confident that stock transactions occur at "fair" prices (Bailey et al. 2006). As a consequence, risk is more widely shared, which should reduce firm's cost of capital (Merton, 1987). The literature also suggests that the enhanced transparency linked to stricter disclosure rules and the potential legal exposure may influence negatively the cost of capital through cash flow effects. In fact, the threat of shareholder litigation makes it harder and more costly for firm's insiders to expropriate outside shareholders. Such bonding (Coffee, 1999; Stulz, 1999) should increase investors' expectation about future cash-flows and improve firm's ability to raise capital. Indeed, the results of many empirical papers suggest that strong securities regulation helps diminish firm's cost of capital and relax financing constraints (Hail and Leuz, 2006; Qian and Strahan, 2007; Qi et al. 2010). To measure different aspects of countries legal system, we rely on three main indicators: (1) legal origin, (2) private enforcement, and (3) public enforcement.

### *Political institutions and firm's financing constraints*

Researchers are also interested in the role that political factors play in shaping financial and economic development. According to Roe (2006, p. 465): "How legislatures choose to regulate reflects legislative policy decisions, voter preferences, and surely interest group power far more than it results from faded historical channels of legal origins". Political risk originates from a variety of sources, such as corruption, political instability, expropriation of investments, capital controls, and lack of transparency. We conjecture that corruption may impact capital allocation for two main reasons. First, lower corruption helps firm's creditors and shareholders' better monitor potential violations in financial contracts (Qi et al. 2010). Second, corruption can be viewed as an unnecessary cost imposed on firms in the form of bribes. According to Chan (2009), higher corruption (e.g. making bribe payments) takes money away from productive inputs. Therefore, as

corruption puts additional demands on liquidity, companies should face binding financial constraints. In 2009, Chan shows that bribes have a negative effect on firm's growth in Bangladesh (a country that faces severe corruption problems). In the same vein, political instability (e.g., frequent changes in government and political violence) undermines countries institutions effectiveness and shakes investors' confidence in financial markets. For instance, Roe and Siegel (2011) show that political instability impedes financial development. Political institutions may also impact the probability of expropriation (Qi et al. 2010). In countries where the expropriation risk is prominent, entrepreneurs invest less in physical assets because the likelihood that firm's assets would be seized is high. If investors fear that government entities could expropriate them, then firms' should not be able to invest according to their growth opportunities, which will weaken capital allocation. We conjecture that more developed political systems and strong political rights make the government less likely to expropriate investments and therefore improve access to finance for firms. Indeed, Qi et al. (2010) show a positive relation between expropriation risk and firm's cost of debt. Another channel through which political institutions may impact capital allocation is the level of investment freedom and trade openness. Many scholars (e.g. Stulz, 1999; Chinn and Ito, 2006) argue that removing capital controls (more investment freedom) allows domestic and foreign investors to engage into more portfolio diversification, which will increase the availability of capital to firms. Furthermore, Rajan and Zingales (2003) investigate how incumbent capital owners oppose financial development and trade openness in some countries. They argue that such opposition can be motivated by the fact that both factors help strengthen new competitors. According to Rajan and Zingales (2003), Incumbents have enough resources to fuel political campaigns that protect their benefits which is not the case for new entrants who lack resources. However, when a nation is open to trade, incumbents' political power and interests change because they face new competitors (Roe, 2006). Therefore, they are less able to oppose financial development. Roe (2006, p.505) argues that: "When European political leaders lowered trade barriers in the decades after World War II- as they sought to unify the Continent economically to avoid future wars- incumbents had less reason to oppose stronger capital markets, which grew". Finally, we conjecture that political institutions may also impact the information environment of corporations. As suggested by Qi et al. (2010), press freedom could be a potential channel through which political institutions may provide an important check upon misappropriation of funds by politicians and corporate managers. It is well known that investigative journalism and free press have historically played an important role in countering corruption and revealing financial scandals in many countries. In fact, when a country financial environment is characterised by high transparency, investors' should be "well informed" and prices should reflect more information and events about a firm. Hence, investors' should expect low returns for their investments given that many theoretical and empirical studies imply a cost premium for external capital because of asymmetric information problems (Myers and Majluf, 1984; Barry and Brown, 1985; Merton, 1987).

## Methodology and hypotheses

We base our empirical methodology on the established literature on investment with financing constraints. According to this literature, financing constraints are measured by the sensitivity of investment to internal capital. For instance, Fazzari et al. (1988) argue that firm's internal capital may impact investment because of a financing hierarchy (Pecking order theory), in which internal funding have a cost advantage over external funding. This cost differential exists because investors are unable to distinguish between good and bad projects, under asymmetric information. As a result, every issue is priced based on the average projects outcomes (Oliner and Rudebush, 1992) and securities issued to back good projects should be undervalued. Such undervaluation implies that the cost of financing good projects with external capital exceeds the cost of funding the same projects with internal capital (lemon premium). Furthermore, the presence of agency problems could also inflate the cost of external finance to reflect costs of monitoring management (use of audits, specific compensation contracts, restrictions and covenants). We conjecture that when the cost differential between internal and external capital is high (binding financing constraints), a value maximizing firm will issue new debt or shares only after it exhausts internal capital. Hence, we should expect that investment spending responds positively to an increase in internal capital for constrained firms (high investment-cash flow sensitivity).

The investment-cash flow sensitivity is also linked to the collateral represented by the net worth of the firm. Gilchrist and Himmelberg (1995) argue that a decrease in cash flow signals a reduction in firm's net worth and an increase in firm's risk profile. Hence, in periods when cash flow is low, financially constrained firms should invest less because the cost of external capital is high. On the other hand, when net worth rises (high cash flow), the cost of external capital should decrease and investment should respond more to cash flow innovation. In this study, we rely on the potential positive association between firm's cash flow and investment expenditures to proxy for capital constraints. We interpret high investment-cash flow sensitivity as evidence that firms are facing binding financing constraints.

To test whether political and legal factors have an impact on firms' financing constraints, we consider the following regression:

$$(I / K)_{i,t} = \beta_0 + \beta_1 (CF / K)_{i,t} + \beta_2 (M / B)_{i,t-1} + \beta_3 (Size)_{i,t-1} + \theta_0 Legal factors_{i,t-1} + \theta_1 Legal factors_{i,t-1} * (CF / K)_{i,t} + \theta_2 Political factors_{i,t-1} + \theta_3 Political factors_{i,t-1} * (CF / K)_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where  $I_{i,t}$  represents investment in plant and equipment for firm  $i$  during period  $t$ ;  $K$  denotes the beginning-of-period value of total assets;  $CF$  (cash flow) is the sum of income before extraordinary items and depreciation net of cash dividends (for robustness, we also measure  $CF$  as : net income + depreciation and/or amortization + changes in deferred taxes);  $M/B$  denotes the market to book ratio, and  $Size$  denotes the natural logarithm of firm size.  $M/B$  is a proxy for investment opportunities and growth, while

size variable controls for potential market imperfections related to firm size. Our main interest in Eq. (1) centers on  $\theta_1$  and  $\theta_3$ . These coefficients represent the impact of legal and political institutions on the relation between investment and firm's internal capital (our proxy of financing constraints). The literature suggests that strong legal institutions (high scores of our legal indicators) improve capital allocation and reduce the cost of external capital (e.g. Stulz, 2009; Qian and Strathan, 2007; Qi et al. 2010). Hence, we expect that  $\theta_1$  is significantly negative because unconstrained firms are supposed to exhibit less investment-cash flow sensitivity. Furthermore, we assume that strong political rights and institutions (more free press, less corrupt officials, and less restrictions on investment) should alleviate firm's financing constraints. We therefore postulate that high scores of our political indicators imply low investment-cash flow sensitivity (low financing constraints). Thus, we expect a significant negative  $\theta_3$  in Eq. (1).

We estimate Eq. (1) using fixed firm and year effects. Fixed firm effects estimation accounts for time-invariant firm characteristics that are unobservable or at least difficult to measure. In addition, because the coefficients of firm fixed effects are determined only by changes in the variables over time for a given firm (see Qi et al. 2010 for a more detailed discussion), relying on firm fixed effects should mitigate concerns about omitted variable bias that may arise because of some excluded country characteristics. On the other hand, fixed year effects are included to capture aggregate business-cycle influences. We consider that differences in countries business cycles could affect our results because favorable economic conditions decrease financing constraints. For robustness, we re-estimate Eq. (1) using industry, country and year fixed effects, noting no differences in tests results. We also use predetermined political and legal factors to reduce the possibility that country characteristics are endogenous with corporate investment. Finally, standards errors in all specifications are adjusted for heteroskedasticity and clustering at the firm-level.

## **Data and univariate analysis**

We compile data from a variety of sources. Appendix A provides sources and detailed definitions of the variables. We test and validate our hypotheses using a large sample of firms originating from 44 countries over the period 1990-2006. Our empirical tests are based on the sensitivity of investment to cash flow. We obtain information on corporate investment, cash flow, size, market-value, and book value from Worldscope. We also consider different sources to measure our country legal variables.

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## Appendix A. Variables definitions and sources

Variables	Definition
<i>A.1 Legal variables</i>	
Anti-Director rights index (Private enforcement)	Represents an index that proxies the level of shareholders' protection. It summarizes the degree to which securities laws protect the rights of investors and address corporate self-dealing. The index covers the following six areas: (1) vote by mail; (2) shares not deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a meeting. <i>Source: Djankov et al. (2008).</i>
Legal origin	Equals 1 if the company is from common law countries and 0 otherwise (French civil law, German civil law and Scandinavian law). <i>Source: Laporta et al. (1998).</i>
Public enforcement	Measures the sanctions (fines and prison term) that apply to controlling shareholders and approving bodies. Ranges from 0 to 1. One-quarter point is added to the index when each of the following sanctions is available: (1) fines for the approving body; (2) jail sentences for the approving body; (3) fines for the controlling shareholder; and (4) jail for the controlling shareholder. <i>Source: Djankov et al. (2008).</i>
<i>A.2 Political variables</i>	
Corruption	Represents an index of the level of corruption in a nation. The higher the level of corruption in a country, the lower is the index score. The latter ranges from 0 to 100 with 0 indicating the highest level of corruption. The scores of such index are derived primarily from Transparency International Corruption Perception Index (CPI). The corruption index is time varying. <i>Source: Heritage foundation and the Wall Street Journal.</i>
Investment freedom	Measures restrictions on the flow of investment capital. Such index ranges from 0 to 100. A higher score indicates few constraints on investment. The index covers the following restrictions: (1) National treatment of foreign investment; (2) Foreign investment code; (3) sectoral investment restrictions; (4) restrictions on land ownership; (5) expropriation of investments without fair compensation; (6) foreign exchange controls; (7) capital controls; and (8) security problems and lack of basic investment infrastructures. The investment freedom index is time varying. <i>Source: Heritage foundation and the Wall Street Journal.</i>
	Measures the freedom of the press. Such index is time varying and ranges from 0 (free press) to 100 (no free press). <i>Source: Freedom House.</i>
	Investment in plant and equipment for firm <i>i</i> during period <i>t</i> . <i>Source: Datastream/Wordscope.</i>

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	Sum of income before extraordinary items and depreciation net of cash dividends. For robustness, we also measure Cash-flow as: net income + depreciation and/or amortization + changes in deferred taxes. <i>Source: Datastream/Wordscope.</i>
	Firm's market to book ratio. <i>Source: Datastream/Wordscope.</i>
Press freedom	Logarithm of the firm's market capitalization. <i>Source: Datastream/Wordscope.</i>
	Number of analysts following firm i during period t. <i>Source : I/B/E/S</i>
A.3 Firm-level variables	Equals 1 if the company is cross-listed via exchange ADRs (Level II and III), ordinary listings and private programs (Rule 144a). <i>Source: Depositary Banks and New York Stock Exchange.</i>
Investment	
Cash-flow	
	An index that rates companies' annual reports for their inclusion or exclusion of 90 items and ranges from 0 to 90 with 90 as the highest standard. <i>Source: Laporta et al. (1998) and Doidge et al. (2004).</i>
Market-to-Book	The country's gross domestic product per capita. <i>Source: World Bank.</i>
Size	
Number of analysts	
Cross-listing dummy	
A.4 Control variables	
Accounting standards index	
Gross Domestic Product	

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Legal origin is a dummy variable set equal to 1 for common law countries and 0 otherwise. We use an anti-director rights index (see Djankov et al. 2008 for more details) to measure the level of investors' protection (private enforcement). This index ranges

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from 0 to 1 and high values indicate strong protection of investors' rights. To proxy for public enforcement, we consider an index that measures the sanctions applied to controlling shareholders and approving bodies. The public enforcement index ranges from 0 to 1 and higher scores correspond to strong public enforcement. Our proxies of political rights capture different aspects of political risk (corruption, expropriation of investment, capital controls, and lack of transparency). To quantify the level of corruption, we use the Heritage foundation corruption index. The latter ranges from 0 to 100 with 100 indicating the lowest level of corruption. Hence, a higher score of our corruption index means that risks connected to corruption are low. Furthermore, to proxy for the expropriation risk and restrictions on the flow of investment, we rely on the investment freedom index (see Appendix A for more details). Higher scores indicate low risk of expropriation and few restrictions on the flow of capital. Finally, we measure the general information environment with an index of the press freedom. Such index ranges from 0 to 100 and high scores indicate no free press. Therefore, greater scores of our press freedom index suggest that asymmetric information problems are severe in the country. Table 1 reports descriptive statistics of our key variables. We provide the mean, median, 5<sup>th</sup> percentile, 95<sup>th</sup> percentile, standard deviation and the number of observations.

Table 1

Descriptive Statistics

This table presents descriptive statistics for variables used in our analysis. We use a large sample of firms originating from 21 developed markets and 23 emerging markets over the period 1990-2006. For each variable, we provide the mean, median, 5th percentile, 95th percentile, standard deviation and the number of observations. All variables are defined in Appendix A.

Variables	Mean	median	5th Pctl.	95th Pctl.	Std dev	N
Investment (I/K)	0.478	0.076	0	0.903	18.621	89769
Cash flow (CF/K)	0.162	0.149	-0.496	0.894	35.694	89741
Size	11.692	11.607	8.628	15.168	1.965	94048
Market-to-Book (M/B)	2.589	1.317	0.1604	6.643	4.167	94576
Anti-director rights index (DRI)	0.615	0.56	0.27	0.96	0.244	170784
Legal Origin dummy (LO)	0.408	0	0	1	0.491	170784
Public enforcement (PE)	0.363	0	0	1	0.404	170076
Corruption (CO)	62.031	67	26	92	24.024	168583
Investment freedom (IF)	60.604	50	30	90	16.910	168583
Press Freedom (PF)	33.019	23	10	81	22.542	161172
Number of analysts (NA)	1.899	0	0	11	4.567	170784
Accounting standards index (ASI)	67.122	65	54	78	7.900	147708
Gross domestic product (GDP)	18908.8 2	21691	558	37867	1371.4	162756

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Table 2 provides correlations between variables. Several patterns stand out in these correlations. First, some variables are highly correlated. Legal origin (LO) and anti-director rights index (DRI) are strongly correlated (0.67). Further, press freedom (PF) and corruption (CO) are also highly correlated (-0.61). Hence, to avoid multicollinearity, some variables should not be included in the regressions simultaneously. For instance, we exclude LO when DRI and public enforcement (PE) are jointly examined, and exclude PF when investment freedom (IF) and CO are jointly examined. Second, firm's investment is positively and highly correlated to cash flow (0.689), which is consistent with the existence of financial hierarchy. Third, analyst coverage (NA), firm size, and US cross-listings (CL) are positively correlated with investment. Fourth, political and legal factors are negatively correlated with investment spending, which is consistent with the fact that strong legal systems and high political rights decrease investment on average. However, we argue that our tests should be best performed by using multivariate regression analysis, because our univariate tests do not account for the potential interrelationships among variables.

Table 2

Pearson Correlations (p-values)

This table presents the correlations between variables. The sample period is from 1990 to 2006.

	I	CF	Size	M/B	DRI	LO	PE	CO	IF	PF	NA	CL
I	1.00											
CF	0.689***	1.00										
Size	0.21***	0.22***	1.00									
M/B	-0.00	-0.00	0.00	1.00								
DRI	-0.10***	-0.08***	-0.12***	0.00	1.00							
LO	-0.17***	-0.15***	-0.17***	0.00	0.67***	1.00						
PE	-0.07***	-0.06***	-0.11***	-0.00	-0.13***	0.21***	1.00					
CO	-0.10***	-0.08***	0.10***	0.01	0.12***	0.022***	0.22***	1.00				

	I	CF	Size	M/B	DRI	LO	PE	CO	IF	PF	NA	CL
<b>IF</b>	-0.03***	-0.02***	-0.05***	0.00	0.11***	0.20***	0.12***	0.47***	1.00			
<b>PF</b>	-0.03***	-0.04***	-0.07***	-0.00	0.40***	0.00	-0.11***	-0.61***	-0.39***	1.00		
<b>NA</b>	0.12***	0.13***	0.61***	0.00	-0.11***	-0.07***	0.00	0.11***	0.09***	-0.13***	1.00	
<b>CL</b>	0.02***	0.02***	0.24***	-0.00	-0.03***	0.00	0.03***	0.00**	0.03***	-0.02***	0.26***	1.00

\*\*\* Significant at 1% level

\*\* Significant at 5% level

\*Significant at 10% level

## Empirical results

Table 3 provides coefficients estimates of variants of Eq. (1). The variables of interest are cash flow and interactions of cash flow with legal and political factors. Our main hypothesis is that strong legal and political institutions reduce financing constraints (investment-cash flow sensitivity). Model 1, 2 and 3, in Table 3, examine the separate impact of DRI, LO, and PE, respectively. In model 1 and 2, the interaction between cash flow and two of our legal proxies (DRI and LO) is negative and significant at 1% level (e.g., for model 1, the coefficient of interest is -0.302 with a p-value of .001), suggesting that high levels of investors' protection and common law origin decrease the investment-cash flow sensitivity. Contrary to predictions, the coefficient of the interaction between cash flow and PE is positive and non significant (0.003 with a p-value of .697), indicating that public enforcement aspects do not impact firm's financing constraints. Model 4, 5 and 6 investigate the impact of our three political factors separately (CO, IF and PF). All three coefficients of interest have their predicted signs and are significant at 1% level. As expected, we find that low corruption (high scores of CO) and high investment freedom (high scores of IF) are associated with low investment-cash flow sensitivity (less financing constraints). Furthermore, as suggested earlier, the PF variable is constructed such as high scores reflect low realization of the underlying factors. In fact, high scores of PF indicate low levels of press freedom. We argue that the absence of press freedom should worsen asymmetric information problems between market participants, and ultimately increase financing constraints (investment-cash flow sensitivity). Indeed, the findings of model 6 suggest that high levels of PF (no free press) increase the investment-cash flow sensitivity.

Table 3

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Firm's financing constraints and political and legal institutions: primary results

This table presents the results of the following regression:

$$(I/K)_{i,t} = \beta_0 + \beta_1(CF/K)_{i,t} + \beta_2(M/B)_{i,t-1} + \beta_3(Size)_{i,t-1} + \theta_0 Legal factors_{i,t-1} + \theta_1 Legal factors_{i,t-1} * (CF/K)_{i,t} + \theta_2 Political factors_{i,t-1} + \theta_3 Political factors_{i,t-1} * (CF/K)_{i,t} + \varepsilon_{i,t}$$

Investment spending divided by total assets (I/K) is the dependent variable. Cash flow/total assets (CF/K), Firm's market-to-book ratio (M/B), firm's size, country legal and political factors are the independent variables. In addition, the political and legal variables are interacted with cash flow to measure the impact of such factors on the investment-cash flow sensitivity. Model (1), (2) and (3) in Table 3 are used to test the impact of three legal factors separately (private enforcement, legal origin and public enforcement). Model (4), (5) and (6) investigate the impact of three political factors separately (corruption, investment freedom and press freedom). The remaining models in Table 3 include both legal and political factors. All models report estimates of regressions with firm fixed and year fixed effects. Standards errors are adjusted for clustering at the firm level. P-values for two-tailed tests are in parentheses. One, two or three asterisks denote significance at the 10%, 5% and 1% levels, respectively.

Independent Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>	<i>Model 9</i>	<i>Model 10</i>
Intercept	-0.300 (0.001) ***	-0.329 (0.001) ***	-0.435 (0.001) ***	-0.443 (0.001) ***	-0.468 (0.001) ***	-0.264 (0.001) ***	-0.269 (0.001) ***	-0.132 (0.001) ***	-0.314 (0.001) ***	-0.218 (0.001) ***
Cash Flow	0.385 (0.001) ***	0.213 (0.001) ***	0.218 (0.001) ***	0.324 (0.001) ***	0.279 (0.001) ***	0.085 (0.001) ***	0.510 (0.001) ***	0.243 (0.001) ***	0.442 (0.001) ***	0.187 (0.001) ***
Market-to-Book	-0.000 (0.474)	-0.000 (0.491)	-0.000 (0.440)	-0.000 (0.403)	-0.000 (0.447)	-0.000 (0.528)	-0.000 (0.423)	-0.000 (0.555)	-0.000 (0.441)	-0.000 (0.581)
Size	0.054 (0.001) ***	0.051 (0.001) ***	0.055 (0.001) ***	0.056 (0.001) ***	0.056 (0.001) ***	0.052 (0.001) ***	0.052 (0.001) ***	0.049 (0.001) ***	0.049 (0.001) ***	0.046 (0.001) ***
<b>DRI</b>	-0.240 (0.001) ***						-0.235 (0.001) ***	-0.221 (0.001) ***		
<b>DRI * Cash Flow</b>										
<b>LO</b>	-0.302 (0.001) ***	-0.104 (0.001) ***					-0.129 (0.001) ***	-0.073 (0.005) ***	-0.096 (0.001) ***	-0.105 (0.001) ***
<b>LO * Cash Flow</b>										

Independent Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>	<i>Model 9</i>	<i>Model 10</i>
		<b>-0.213</b>							<b>-0.192</b>	<b>-0.179</b>
<b>PE</b>		<b>(0.001)</b> ***	-0.086						<b>(0.001)</b> ***	<b>(0.001)</b> ***
			(0.001) ***				-0.105	-0.059		
<b>PE * Cash Flow</b>							(0.001) ***	(0.001) ***	-0.033	-0.001
			<b>0.003</b>						(0.011) **	(0.871)
			<b>(0.697)</b>				<b>-0.000</b>	<b>0.008</b>		<b>0.006</b>
<b>CO</b>				-0.000					<b>-0.009</b>	
				(0.001) ***			<b>(0.930)</b>	<b>(0.320)</b>	<b>(0.294)</b>	<b>(0.429)</b>
							0.000			
<b>CO * Cash Flow</b>				<b>-0.002</b>			(0.413)		-0.000	
				<b>(0.001)</b> ***			<b>-0.002</b>		(0.013) **	
					-0.000					
<b>IF</b>					(0.434)		<b>(0.001)</b> ***		<b>-0.003</b>	
								0.000	<b>(0.001)</b> ***	0.000
					<b>-0.001</b>		0.000			
<b>IF * Cash Flow</b>					<b>(0.001)</b> ***		(0.134)	(0.001) ***	0.000	(0.001) ***
						-0.002	<b>-0.002</b>	<b>-0.002</b>	(0.183)	<b>-0.001</b>
<b>PF</b>						(0.001) ***	<b>(0.001)</b> ***	<b>(0.001)</b> ***	<b>-0.001</b>	<b>(0.001)</b> ***
									<b>(0.001)</b> ***	
<b>PF * Cash Flow</b>						<b>0.003</b>		-0.002		-0.002
						<b>(0.001)</b> ***		(0.001) ***		(0.001) ***
								<b>0.003</b>		<b>0.003</b>
								<b>(0.001)</b> ***		<b>(0.001)</b> ***
<b>R<sup>2</sup></b>	0.4396		0.4375		0.4408					
<b>N</b>	81 794	0.4193	81 794	0.4729	81 473	0.4539				
		81 939		81 473		77 203				
							0.4699			
							81 473	0.4525	0.4643	0.4453
								76 882	81 473	76 882

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Independent	<i>Model</i>	<i>Model</i>	<i>Model</i>	<i>Model</i>	<i>Model</i>	<i>Model</i>	<i>Model</i>	<i>Model</i>	<i>Model</i>	<i>Model</i>
Variables	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>

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An alternative interpretation of the positive interaction effect between cash flow and PF is that low levels of PF (greater press freedom) are associated with low investment-cash flow sensitivity (low financing constraints). The remaining models in Table 3 examine the joint impact of both legal and political factors. Due the possibility of results being contaminated by multicolliniarity, we do not include some highly correlated variables simultaneously (e.g., LO and DRI or CO and PF). When our legal and political indicators are included together, our primary findings remain unchanged. For instance, when we examine the joint impact of DRI, PE, CO, and IF (model 7 in Table 3), we find that high scores of DRI, CO and IF decrease significantly the investment cash flow sensitivity. The impact of PE remains non significant (the coefficient of interest is -0.000 with a p-value of .930). These findings do not lend support to the claim that political factors are irrelevant given legal factors.

Table 4

The impact of political institutions on firm's financing constraints, conditional on legal origin and the level of investors' protection

This Table addresses whether our political institutions proxies have explanatory power for firm's financing constraints, given legal institutions. Panel A reports results of separate regressions for countries with strong investors' protection laws (model (1), (2) and (3)) and countries with low levels of investors' protection (model (4), (5) and (6)). Panel B presents findings of separate regressions for common law countries (model (7), (8) and (9)) and civil law countries (models (10), (11) and (12)).

**Panel A. Separate regressions based on the level of investors' protection**

Independent Variables	Countries with strong legal protection for minority investors			Countries with weak legal protection for minority investors		
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>
Intercept	-0.189 (0.001) ***	-0.182 (0.001) ***	0.071 (0.006) ***	-0.717 (0.001) ***	-0.649 (0.001) ***	-0.552 (0.001) ***
Cash Flow	0.381 (0.001) ***	0.172 (0.001) ***	0.107 (0.001) ***	0.306 (0.001) ***	0.478 (0.001) ***	0.045 (0.001) ***
Market-to-Book	-0.000 (0.757)	-0.000 (0.768)	-0.000 (0.842)	-0.000 (0.418)	-0.000 (0.416)	-0.000 (0.450)
Size	0.020 (0.001) ***	0.023 (0.001) ***	0.019 (0.001) ***	0.083 (0.001) ***	0.080 (0.001) ***	0.081 (0.001) ***
CO	0.000 (0.001) ***			0.000 (0.455)		
CO * Cash Flow				<b>-0.003</b> (0.001) ***		
IF		-0.000 (0.778)			-0.000 (0.134)	
IF * Cash Flow		<b>0.000</b> (0.049)			<b>-0.003</b> (0.001)	

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Independent Variables	Countries with strong legal protection for minority investors			Countries with weak legal protection for minority investors		
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>
<b>PF</b>		**	-0.003		***	-0.002
			(0.001)			(0.001)
			***			***
<b>PF * Cash Flow</b>			<b>0.002</b>			<b>0.003</b>
			<b>(0.001)</b>			<b>(0.001)</b>
			***			***
<b>R<sup>2</sup></b>		0.3511	0.3547	0.4798	0.4727	0.4637
<b>N</b>	0.3721	38 261	33 752	43 212	43 212	43 451
		38 261				

## Panel B. Separate regressions based on legal origin

Independent Variables	Common law countries			Civil law countries		
	<i>Model 7</i>	<i>Model 8</i>	<i>Model 9</i>	<i>Model 10</i>	<i>Model 11</i>	<i>Model 12</i>
<b>Intercept</b>	-0.082	-0.072	-0.041	-0.658	-0.800	-0.509
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	***	***	***	***	***	***
<b>Cash Flow</b>	0.335	0.515	0.330	0.301	0.265	0.081
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	***	***	***	***	***	***
<b>Market-to- Book</b>	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.891)	(0.938)	(0.994)	(0.421)	(0.420)	(0.446)
<b>Size</b>	0.008	0.009	0.009	0.081	0.086	0.079
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Independent Variables	Common law countries			Civil law countries		
	<i>Model 7</i>	<i>Model 8</i>	<i>Model 9</i>	<i>Model 10</i>	<i>Model 11</i>	<i>Model 12</i>
<b>CO</b>	***	***	***	***	***	***
	0.000			-0.001		
<b>CO * Cash Flow</b>	(0.474)			(0.001)		
	<b>0.000</b>			<b>-0.002</b>		
	<b>(0.560)</b>					
<b>IF</b>		-0.000		<b>(0.001)</b>	0.001	
		(0.002)		***	(0.001)	
<b>IF * Cash Flow</b>		***			***	
		<b>-0.002</b>			<b>-0.001</b>	
<b>PF</b>		<b>(0.001)</b>			<b>(0.001)</b>	
		***	-0.000		***	-0.002
			(0.001)			(0.001)
<b>PF * Cash Flow</b>			***			***
			<b>0.000</b>			<b>0.002</b>
			<b>(0.001)</b>			<b>(0.001)</b>
			***			***
R <sup>2</sup>	0.6058					
N	30 148	0.6008	0.5846	0.4435	0.4061	0.4221
		30 148	25 639	51 325	51 325	51 564

Table 4 presents separate regressions that examine the impact of political institutions on firm's financing constraints, conditional on the level of investors' protection (Panel A) and legal origin (Panel B). This additional analysis addresses whether our political factors have explanatory power for firm's financing constraints, given legal institutions. The results show that our political factors impact firm's financing constraints and behave quite similarly in different legal systems. Hence, our findings are consistent with the view that both political and legal factors are relevant in explaining financing constraints. It is

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worth mentioning that the empirical specifications in Table 3 and 4 are not intended to examine whether legal and political institutions are substitutes or complement.

One potential problem with our primary results is the omitted effect of analyst coverage and US cross-listings. As suggested by Hope (2003), analyst following could moderate or eliminate any effect of country institutions because firms followed by a large number of financial analysts may have a rich information environment and therefore less severe asymmetric information problems (less financing constraints). We should then control for analyst coverage in our regressions. We obtain data on analyst coverage from I/B/E/S. Furthermore, we propose to include a dummy variable set equal to 1 for firms with US cross-listings and 0 otherwise because such mechanism may have an impact on firm's access to capital (Coffee, 1999; Stulz, 1999; and Hail and Leuz, 2009). In fact, in the literature, the US cross-listing decision is viewed as a mechanism that enhances the protection of minority investors. The notion that non-US firms may cross-list in the US in order to improve investors' protection and capital allocation has been proposed by Stulz (1999) and Coffee (1999). These authors argue that US strict disclosure rules and enforcement by the Securities and Exchange Commission (SEC) help relax firm's financing constraints. The data on US cross-listings comes from Bank of New York, Citibank, Deutsche Bank, JP Morgan, NYSE and NASDAQ websites. In Table 5, model 1, 3, 5, and 7 include controls for analyst coverage and interactions between analyst coverage and firm's cash flow. Taking into account the potential moderating role of analysts, we find that DRI impact becomes non significant (e.g., our coefficient of interest is -0.013 with a p-value of .698 in the case of model 1), which suggests that our DRI primary results are not robust to some aspects of our methodology. Furthermore, the coefficient of the interaction between PE and cash flow becomes positive and significant in two specifications (model 1 and 5), which runs contrary to the conventional wisdom that strong public enforcement aspects allow for more efficient financial contracts and their enforcement (less risk for investors and hence less financing constraints for firms). On the other hand, the remaining coefficients reinforce the results reported in Table 3. In fact, after controlling for analysts' activities, we show that common law origin, low levels of corruption, high press freedom, and less restrictions on investment help alleviate firm's financing constraints. In model 2 and 6 of Table 5, we augment Eq. (1) with a US cross-listing dummy and interactions between US cross-listings and cash flow. Again, we show that common law origin (model 6) and high levels of investors' protection (model 2) alleviate firm's financing constraints. In addition, improvements in IF and CO translate into less investment-cash flow sensitivity. Finally, model 3, 4, 7, and 8 include other country-level factors (accounting standards (ASI) and the level of economic development (GDP)), in addition to controls for NA and CL. When we use these additional controls, we see that LO, high IF and PF decrease firm's financing constraints, while DRI and PE remain non significant. In specification 3, 4, 7 and 8, we do not test for the impact of CO because CO and GDP are highly correlated (0.7948, results not tabulated). Again, our DRI primary results are not robust to some aspects of our methodology.

Table 5

Firm's financing constraints and political and legal institutions: robustness results

For robustness, we add several control variables to equation 1. We use analyst coverage because analyst activities may impact firm's financing constraints. Further, we also propose to include a US cross-listing dummy to control for differences in financing constraints between firms with US cross-listings (Exchange and private programs) and firms without US cross-listings. Finally, we control for accounting standards and the level of economic development. All models report estimates of regressions with firm fixed and year fixed effects. Standards errors are adjusted for clustering at the firm level. P-values for two-tailed tests are in parentheses. One, two or three asterisks denote significance at the 10%, 5% and 1% levels, respectively.

Independent Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>
Intercept	0.318 (0.001) ***	-0.268 (0.001) ***	0.663 (0.001) ***	0.010 (0.839)	0.228 (0.001) ***	-0.314 (0.001) ***	0.297 (0.001) ***	-0.350 (0.001) ***
Cash Flow	0.340 (0.001) ***	0.511 (0.001) ***	0.901 (0.001) ***	0.585 (0.001) ***	0.328 (0.001) ***	0.436 (0.001) ***	0.903 (0.001) ***	0.665 (0.001) ***
Market-to-Book	-0.000 (0.608)	-0.000 (0.421)	-0.000 (0.705)	-0.000 (0.527)	-0.000 (0.600)	-0.000 (0.440)	-0.000 (0.726)	-0.000 (0.538)
Size		0.052 (0.001) ***		0.053 (0.001) ***		0.049 (0.001) ***		0.051 (0.001) ***
DRI	-0.280 (0.001) ***	-0.238 (0.001) ***	-0.144 (0.001) ***	-0.160 (0.001) ***				
DRI * Cash Flow								
LO								
LO * Cash Flow								
PE								
PE * Cash Flow								

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Independent Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>
<b>CO</b>	<b>0.075</b> ***	***	<b>-0.001</b> (0.924)	<b>-0.021</b> (0.147)	***	**	***	***
<b>CO * Cash Flow</b>	<b>(0.001)</b> ***	<b>-0.005</b> (0.559)			<b>0.067</b> ***	<b>-0.013</b> (0.142)	<b>0.009</b> (0.505)	<b>-0.010</b> (0.450)
	0.000	0.000				-0.000		
<b>IF</b>	(0.005) ***	(0.399)			-0.000 (0.219)	(0.013) **		
	<b>-0.001</b>	<b>-0.002</b>			<b>-0.001</b>	<b>-0.003</b>		
<b>IF * Cash Flow</b>	<b>(0.001)</b> ***	<b>(0.001)</b> ***	-0.000 (0.067) *	0.000 (0.857)	<b>(0.001)</b> ***	<b>(0.001)</b> ***	-0.000	0.000
	0.000	0.000						
<b>PF</b>	(0.096) *	(0.124)	<b>-0.002</b> (0.001) ***	<b>-0.003</b> (0.001) ***	0.000 (0.163)	0.000 (0.177)	(0.331)	(0.297)
<b>PF * Cash Flow</b>	<b>-0.002</b> (0.001) ***	<b>(0.001)</b> ***	-0.001 (0.001) ***	-0.001 (0.001) ***	<b>-0.002</b> (0.001) ***	<b>-0.001</b> (0.001) ***	<b>(0.001)</b> ***	<b>(0.001)</b> ***
<b>Log (1+NA)</b>			(0.001) ***	(0.001) ***			-0.001	-0.001
				<b>0.002</b>			(0.001) ***	(0.001) ***
<b>Log(1+NA)* Cash Flow</b>			<b>0.002</b> (0.001) ***	<b>(0.001)</b> ***			<b>0.002</b> (0.001) ***	<b>0.002</b> (0.001) ***
<b>CL</b>	0.044 (0.001) ***		0.042 (0.001) ***		0.044 (0.001) ***		0.037 (0.001) ***	
<b>CL * Cash Flow</b>	0.061 (0.001) ***		0.057 (0.001) ***	-0.086 (0.001) ***	0.061 (0.001) ***		0.056 (0.001) ***	
<b>GDP</b>		-0.073 (0.001) ***				-0.067 (0.001) ***		-0.073 (0.001) ***
<b>GDP * Cash Flow</b>		0.103 (0.001) ***		-0.060 (0.624)				-0.012
<b>ASI</b>			0.000	(0.001)		(0.001) ***		(0.293)
								-0.000

Independent Variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>
			(0.013) **	***			-0.000	(0.001) ***
ASI * Cash Flow			-0.000	-0.000			(0.002) ***	-0.000
			(0.680)	(0.363)			-0.000	(0.383)
			-0.004	-0.003			(0.245)	0.003
			(0.001) ***	(0.001) ***			0.001	(0.001) ***
R <sup>2</sup>			-0.010	-0.004			(0.092) *	-0.005
N			(0.001) ***	(0.001) ***			-0.011	(0.001) ***
							(0.001) ***	
		0.4518						
	0.4797	81 473		0.5093	0.4722	0.4447		
	80 056		0.5244	69 209	80 056	81 473		0.5007
			70 432				0.5156	69 209
							70 432	

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Table 6

Firm's financing constraints and political and legal institutions: controls for the endogeneity of analyst coverage and US cross-listing decision

This table reports the results of the Heckman (1979) two-stage procedure. In the first stage, we specify a model of the choice of covering a firm (model (1) and (3)) and the choice of cross-listing in US markets (model (2) and (4)). In the second stage, we estimate our main equation. Table 6 reports estimates of the impact of private enforcement, public enforcement and political factors on the investment-cash flow sensitivity.

**Endogenizing analyst coverage and US cross-listing for regressions using jointly private enforcement, public enforcement and political factors**

First stage	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	Second Stage	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
	Probit	Probit	Probit	Probit		(I/K)	(I/K)	(I/K)	(I/K)
	(NA)	(CL)	(NA)	(CL)					
Intercept	-10.562 (0.001) ***	-0.820 (0.001) ***	-20.658 (0.001) ***	-0.690 (0.001) ***	Intercept	1.543 (0.001) ***	0.317 (0.002) ***	1.593 (0.001) ***	0.363 (0.015) **
Size	1.590 (0.001) ***	0.062 (0.001) ***	2.097 (0.001) ***	0.053 (0.001) ***	Cash Flow	0.686 (0.001) ***	1.474 (0.001) ***	0.681 (0.087) *	1.768 (0.001) ***
TV	-0.097 (0.159)		0.110 (0.001) ***		Market-to-Book	-0.000 (0.134)	-0.000 (0.125)	-0.000 (0.080) *	-0.000 (0.236)
EV	0.026 (0.576)		-0.003 (0.828)		Size		0.163 (0.001) ***		0.161 (0.001) ***
O	-0.019 (0.013) **		-0.014 (0.001) ***		DRI	0.0327 (0.616)	0.085 (0.121)	0.978 (0.001) ***	0.570 (0.001) ***
M/B		-0.000 (0.550)		-0.000 (0.512)	DRI * Cash Flow	-0.000 (0.997)	-0.348 (0.238)		
Leverage		0.000 (0.977)		0.000 (0.965)	LO			-0.279 (0.342)	-1.140 (0.003) ***
LO		0.019 (0.383)		0.030 (0.072) *	LO * Cash Flow				
					PE	-0.108 (0.002)	0.131 (0.001)	0.173	
					PE * Cash Flow				

First stage	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	Second Stage	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
	Probit	Probit	Probit	Probit		(I/K)	(I/K)	(I/K)	(I/K)
	(NA)	(CL)	(NA)	(CL)					
						***	***	(0.001)***	0.259
					CO	-0.247 (0.001)***	-0.487 (0.001)***	-0.149 (0.194)	(0.001)*** -0.454
					CO * Cash Flow	0.000 (0.804)	0.002 (0.003)***		(0.001)***
					IF	-0.007 (0.001)***	-0.004 (0.047)**		
					IF * Cash Flow	-0.003 (0.001)***	-0.003 (0.001)***	(0.001)***	-0.000
					PF	-0.003 (0.037)**	-0.013 (0.001)***	(0.011)**	(0.474) -0.014
					PF * Cash Flow				(0.003)***
					Log (1+NA)			-0.019 (0.001)***	-0.010
					Log(1+NA)* Cash Flow			0.006 (0.013)**	(0.001)*** 0.007
					CL	0.396 (0.001)***		0.438 (0.001)***	(0.011)**
					CL * Cash Flow	-0.016 (0.001)***		-0.104 (0.001)***	
					GDP		-0.420 (0.001)***		-0.313
					GDP * Cash Flow		-0.035		(0.001)

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First stage	Model 1	Model 2	Model 3	Model 4	Second Stage	Model 1	Model 2	Model 3	Model 4
	Probit	Probit	Probit	Probit		(I/K)	(I/K)	(I/K)	(I/K)
	(NA)	(CL)	(NA)	(CL)					
							(0.825)		***
					ASI				0.191
								0.000	(0.280)
					ASI * Cash Flow			(0.001)	0.000
								***	(0.001)
					$\lambda$			-0.000	***
								(0.718)	-0.000
								-0.006	(0.678)
								(0.023)	-0.001
								**	(0.446)
					N		2.749	-0.001	-0.007
						-27.717	(0.001)	(0.778)	(0.336)
						(0.001)	***	-9.516	2.063
						***		(0.001)	(0.001)
								***	***
							67 492		
						26 471			
								25 991	60 093

In Table 5, analyst coverage and US cross-listings are viewed as exogenous variables. However, a remaining concern is endogeneity because not all firms in our sample have analyst coverage. In reality, financial analysts could self-select the firms they follow based on their financial status, which will introduce a selection bias. In the same line of reasoning, cross-listing in US markets is not a random decision, which raises the possibility of an endogenous relation between the US cross-listing dummy and our dependant variable (Investment spending). Consequently, we propose to test the determinants of analyst coverage and US cross-listings and their effect on firm's financing constraints using the Heckman's (1979) two-step estimator.

In the first stage, through a probit model, we model the choice of covering a firm or the choice of cross-listing on US markets. Building upon prior literature (e.g., Barth et al.'s 2001; Piotroski and Roulstone, 2004; and Chan and Hameed, 2006), we hypothesize that analysts' activities are affected by firm's size, trading volume (TV), earnings volatility (EV), and Ownership (O). Furthermore, we follow Doidge et al.' (2004) and make the cross-listing decision depend on firm's size, LO, firm's growth opportunities (M/B ratio) and leverage. The results of the Heckman's two-stage procedure are reported in Table 6. Again, some of our primary results are not robust to endogeneity controls. In particular, we find that strong public enforcement is associated with low investment-cash flow sensitivity. For instance, the interaction term (PE \* cash flow) is negative and significant at 1% level in three of the fourth specifications reported in Table 6. We also find no relation between DRI and firm's financing constraints in three of the fourth specifications that investigate DRI impact and other institutional factors. These additional findings show again that private enforcement has no "real" consequences on firm's financing constraints, standing in contrast to results found in previous papers. On the other hand, the results (not tabulated) for legal origin (endogenizing NA and CL for regressions using jointly LO, PE, and political factors) remain unchanged and are consistent with previous research. In fact, legal origin can be viewed as an important legal factor in explaining financing constraints. Finally, low corruption, few restrictions on investment, and high press freedom still improve firm's financial status, confirming our earlier results. A consideration of the combined evidence in Table 3, 4, 5 and 6 imply the following conclusions. First, common law origin affects positively and strongly capital allocation. Second, strong public enforcement aspects help relax firm's financing constraints, but legal origin is a more "primitive" determinant of better capital allocation than public enforcement. Third, private enforcement is not important in explaining firm's financing constraints. Fourth, we find strong negative associations between press freedom, investment freedom and the sensitivity on investment to the availability of cash flow. Finally, low levels of corruption help improve capital allocation.

## Conclusion

In this paper, we investigate the impact of country political and legal factors on capital allocation. In particular, we examine the roles of legal origin, public enforcement, private enforcement and national political rights (corruption, press and investment freedom) in relaxing firm's financing constraints. Our analysis is based on models of capital markets imperfections that suggest that information asymmetry increases the sensitivity of investment to internal capital. The results indicate that financing constraints, proxied by the investment-cash flow sensitivity, are negatively related to legal and political development. We show that common law origin and strong public enforcement of securities laws reduce the sensitivity of investment to the availability of internal capital. In contrast, the private enforcement aspects of securities laws have no impact on firm's financing constraints. Moreover, we find that low levels of corruption and high investment freedom allow for an easy access to external capital for firms. We also

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provide evidence that improvements in the general information environment (e.g., high freedom of the press) help alleviate firm's financing constraints.

We contribute to the literature by proposing a new empirical approach that examines the impact of political institutions on corporate investment. We also extend the existing literature by considering the joint impact of political and legal factors on investment-cash flow sensitivity. Summarizing, the results of this research indicate that both legal and political institutions are important in explaining firm's financing constraints. As a result, academics and policy makers should not dismiss political rights as relevant factors in capital allocation.

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## THE NEED AND IMPORTANCE OF A VOLUME BASED INDEX

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**Abstract:** *The importance of volume study has already been highlighted through various researches world-wide. Volume is studied in isolation as confidence proxy; as a liquidity parameter; depth assessment indicator, whereas, volume when studied along with other parameters such as price or returns, reveals interesting conclusions like price direction, momentum, etc. All these have been several times estimated and proven. The empirical results by some of these research initiatives conclude the imperative presence of Volume in market analysis and forecasting.*

*Volumes were and till date are studied in absolute terms for various time intervals. These intervals (normally daily volumes) reveals discontinued pattern of observations. By discontinued pattern of observations we mean the volumes start with zero and cumulate for a day and next day again starts with a zero. The study of such data poses lots of limitations and hindrances in day to day decision making such as relative understanding of volumes patterns, time series analysis and relative analysis of volume with price direction.*

*The aforesaid limitations can be mitigated if volumes studies get reinvented and shaped as a standardized tool like an Index. Volume index would not only help reveal the changes in volumes but also facilitate a long term continued study of market liquidity. The formation of such indices world-wide would also indicate the global fund flow process. Hence, the need of the hour is a volume based index in all the markets of the world to complement the analysis of stock market and facilitate analysts and investors to get a holistic view of the markets.*

### Introduction

Stock market plays an important role as a financial intermediary in an economy. It facilitates the flow of funds from investors to entrepreneurs. Efficiency of the market depends upon various factors such as volume of trading, number of participants (Barnes, 1986) and flow of information. Trading volume indicates the state of the economy (Schneider, 2009) and it is higher in developed markets than in emerging and frontier markets. Thin volume of trading makes the interpretation of stock movement difficult for traders. Beaver (1968) mentioned that trading volume gives rough insight about earnings of a company and its impact on market participants. Trading volume not only measures the liquidity of stock markets but also the impact of information and momentum of the market (Brown *et al.* 2009). It is also influenced by corporate announcements / financial disclosures earlier than the price (Cready & Hurt 2002). Now, though investors generally have same public information, they infer it differently which leads to trading activity in the stock market (Haris & Raviv 1993). The changes in trading volume reflect changes in the expectation of individual investors (Brown *et al.* 2009). May (2011) has translated the work of Bacheiler (1900) and stated that the relationship between price fluctuation in stock market and investor disagreement and trading volume was a matter of concern even 100 years ago. Almost after 80 years of Bacheiler; Ross (1989) identified the need of a model to study the investors' disagreement and trading volume. Since then, a number of studies have been conducted to study the relationship between price and volume. Amongst all, the most important study was conducted by Wang (1994) where he stated that trading volumes is a dynamic variable reflecting behavioural heterogeneity of the traders and can be used as an important tool to study behaviour of asset price. Volume studies are important in determining the asset returns and have a positive relation with the magnitude of the price change in the equity market (Karpoff 1987). In contrast Bhagat & Bhartiya (1996) identified an asymmetric relation between price and volume. Moreover, Wang (1994) stated that volatility in volume depends upon the information flow in the market. Similarly, Gervais *et al.* (2001) identified that stocks whose trading volume is high have a higher probability of generating positive return in subsequent periods. Volume not only reflects the depth of market but also acts as confidence proxy for the market.

### Literature Review

Investors and technical analysts use volume as an indicator to predict the movement of the stock. Blume *et al.* (1994) stated that volume and price change have positive relationship which helps technical analysts in decision making. There are a number of volume indicators used by technical analysts such as on-balance volume (OBV), money flow index, Accumulation / Distribution Line and Chaikin Money Flow. Thorp (2001) stated that on-balance volume (OBV) indicator was propounded by Joseph Granville in year 1963. The indicator considers today's and previous day's closing price and cumulative volume of today's and previous days. This indicator can be used to study the pattern of volume on a daily basis. However, it does not assist investors to study the pattern of volume on intraday basis. According to National Stock Exchange of India Limited (2010) accumulation/ distribution (AD) indicators considers the high, low and closing price of the shares and volume of the corresponding days to study the pattern. Chaikin Money Flow is the extended version of the accumulation/ distribution indicator, it considers the accumulation/ distribution values for 21 days period. Similarly, Money flow index (MFI) also considers the high, low and close price

of the shares and volume of the corresponding period to determine the index. The index assists investors to infer the degree of the demand of the stock (Granville 1976). However, all of the above mentioned indicators assist investors to study the pattern of stock, they are not made to study the pattern of volume of market and also these indicators do not help in analysing the pattern of volume on intraday basis.

According to Bessembinder & Seguin (1993) there are many empirical analyses which suggest positive relationship between price, volume and volatility of tradable asset. In addition to this, Chen *et al.* (2001) examined nine different national markets and concluded that volume consist some information about return of the stock. Blume (1994) also mentioned that past returns and past volumes indicate the expected pattern of stock market. Moreover to this, Kamath *et al.* (1996) stated that changes in price and volume have positive relationship, i.e. if price increases volume would also increase and vice versa. Other than concomitant relationship between trading volume and returns of stock, the dynamic relationship of volume is also observed in various literatures (Blume *et al.* 1994, Wang 1994, and Chordia & Swaminathan 2000).

Till today, most of the studies have been conducted revolving the price and volume relationship. Therefore, the price/ return indices world-wide have served the purpose for studying the direction of the asset values, leading to study of growth of an economy. As it has already been proven by past studies that price/ return alone cannot be a true reflector of growth unless studied with other variables like volumes. Ross (1989) has also mentioned the need of a standardized tool to study the significance and pattern of volume in stock market. However, still there is no benchmark/ indices which can study the pattern of volume of the market.

In this paper, we propose to create a volume index, linked to the broad market price index of a country (India); with base year either matched to the base year of the price index or any other more appropriate year as the case may be. The propose index will help investors to study the pattern of the volume and price of the stock market. It will also help to determine the efficiency of the stock market. The target segment of this research paper is stock exchanges, trading members, investment management firms, researchers who study the behaviour and efficiency of the market. It may also be used by regulatory authorities to get some insight from the index, while designing policies, regulations and even invigilation activities for the stock market.

The pattern of the stock market studies through the price, volume and volatility. Investors and academicians use these three key components to invest in the stock market and study the efficiency of the stock market. There are number of benchmarks and indices based on price and volatility such as S&P 500, Nifty and VIX to assist investors and academicians to study the pattern of the stock market. However, there is no benchmark to study the pattern of volume of the stock market.

### *Index*

A market index is a combination of stocks representing the various industries/ industry or other investment vehicle together. According to Chakrapani *et al.* (2011), index is a statistical method to measure the change in economy or stock market. The market index presents the total value of those represented stocks as against the value of base year. Similarly Securities Exchange Commission (2014) has stated:

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*"A market index tracks the performance of a specific "basket" of stocks considered to represent a particular market or sector of the U.S. stock market or the economy."*

In addition to SEC, Shilling (1998) wrote a book title "International Guide to Securities Market Indices" which is well known for the index study. He mentioned in the book that index is a barometer of movement and direction of prices of various financial instruments such as stock, money market instruments, real estate etc. Index is derived from the calculation, which is calculated according to their simple or composite structure against the base value of the underlying determined at the inception of index and the index moves continuously according to movements in the underlying.

### *Market Capitalization Based Index*

Broadly the market indexes are based on prices of the composition of the stocks (Feeney & Hester 1964). The stocks are part of the portfolio; that is why they get some weight according to the companies' capitalization value. Therefore, the total value of index is a weighted average price of the stocks in the portfolio as compared to base year's weighted average price of those stocks in the portfolio. Such indexes are called price/ total return index (S&P Dow Jones Indices, 2014). While calculating the capitalized value of shares, the product of price of the shares and total number of issued shares or free float shares are considered. Moreover, there are few other types of indexes which cover other key factors of stock market such as liquidity, volatility and interest rates etc. However, there are number of academic papers (see Jun *et al.* 2008) available which suggest that price and return index does not solve the purpose of true benchmarking of the market. As market capitalization indices always overweighs the overvalued stock and underweight the undervalued stock; therefore, few new approaches of constructing index have evolved such as fundamental index (Jun *et al.* 2008) and smart beta index (Lexicon 2014). Despite acknowledging the fact that price and volume have strong relationship, no benchmark is developed till today which can study the pattern and significance of volume in stock market. All above mentioned indexes are basically based on price, dividend and total number of issued shares or number free float shares, no return indexes covers the impact of volume traded of the shares.

### *Volatility Index*

Volatility is one of the key factors of stock market. Investors estimate the volatility of the stock/market to take an investment decision. According to Chiang and Doong (2001) lower stock market return as compared to expected return induces more volatility in the market. The volume and volatility relationship has been studied so long. In earlier literatures, a positive relationship between volume and immediate volatility has been indicated; see Epps & Epps (1976) and Karpoff (1987). Morgan (1976) also found out that variance in stock return is related with the traded volume of the shares. Later, Lamoureux & Lastrapes (1990) also identified the explanatory power of trading volume with respect to variation in daily return. The same informational power and volume and its relation with volatility has been observed in Korean stock market (Pyun *et al.* 2000). Kumar & Singh (2009) mentioned that any unexpected information does have impact on volatility and concomitant volume of the stock.

Academics and researchers study the volatility to conduct empirical analysis on stock market. These requirements of stock market led Chicago Board of Exchange to introduce VIX™ in year 1993 to study the pattern and measure the market expectations (Chicago Board of Exchange 2009). Furthermore, Bardgett (2013) has mentioned that "*The VIX index has been constructed to approximate non- parametrically the expected future realized volatility of*

*the S&P 500 returns over the next 30 days*". According to Chicago Board of Exchange, people are considering VIX as a barometer of market sentiment. If VIX<sup>TM</sup> is increasing; it can easily infer that volatility in market is increasing and vice-versa. While calculating the VIX<sup>TM</sup>, volatility in return (price), time to expiration, forward index level, strike prices of index and risk free interests are considered. This shows that the significance of volume in this index is also missing. Therefore, the volatility index (VIX<sup>TM</sup>) does not assist to study the liquidity/ volume in the stock market.

### *Market Liquidity*

The most important factor of economic theory is equilibrium of price through supply and demand. Liquidity is one of the key indicators of stock market see Kaldec & McConnell (1994), Silber (1991), and Brennan & Subrahmanyam (1996). Efficiency of the market depends upon the availability of the liquidity of the stock market. If a market is illiquid, the bid-ask spread would be higher which eventually increase the transaction costs for investors.

The importance of volume has led to development of the following models to study pattern of volume.

Methodology	Description	Studied by
Aggregate Share Volume	Total number of shares traded for the specified period	Gallant <i>et al.</i> (1992), Hiemstra and Jones (1994) and Ying (1966)
Aggregate/ Share Turnover	Number of shares traded during the specified period/ Total number of outstanding shares	James and Edmister (1983) and Lakonishok and Vermaelen (1986)
Individual Share Volume	Price/ Volume or Volatility/ volume	Epps and Epps (1976), James and Edmister (1983) and Andersen (1996)
Relative Individual Dollar Volume	Individual dollar volume normalized by aggregate daily trading volume of market	Tkac (1996)
Total number of trades	Total number of trades in stock market	Conrad, Hameed and Niden (1994)
Number of days	Total number of days in a year	James and Edmister (1983)

All of the above mentioned methodologies consider volume in a different way while analysing its pattern. However, none of the above mentioned methodologies solve the issue of starting point at the time of opening of the market and cumulative traded volume as the time passes in a day.

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### *Liquidity Index (LIX)*

Keeping the same view of importance of volume, FTSE has launched series of indexes which are based on liquidity of the stocks. To form such indexes, most liquid stocks are considered. After identifying the number of stocks, index would be formed on the basis of free float capitalization rate (FTSE, 2010). Though, the liquid index forms on the basis of most liquid stocks, it doesn't serve the purpose of studying the pattern of volume of stock market. Since, it is once again considered the price and return of those liquid stocks to form the index. It does not solve the purpose of studying pattern of volume in stock market.

### **Research Objectives**

Lack of an appropriate benchmark to study the pattern and significance of volume in stock market on a continuity basis is the primary motivation behind this study. The objective of conducting research is to identify the benchmark to study the pattern of volume/ value in the financial market. In order to meet its objectives, the study poses the following questions:

1. Does stock market need a standard/ benchmark index based on volume?
2. What would be the methodologies to construct the benchmark volume based index?
3. How the proposed index would be beneficial to the key stake holders of financial markets?

### **Research Methodology:**

The transaction volume and last traded price is collected for a 3 months period from 03 March 2014 to 29 May 2014 of Nifty Stocks at 10 minutes time interval, which helped us to calculate the value (turnover) of that interval. Later, the cumulative traded volume at each interval has been calculated by adding the cumulative traded volume at previous interval and the traded volume at immediate time interval. Once the cumulative traded volume has been ascertained at each interval, the proxy volume has been calculated. To calculate the proxy volume at every time interval, extrapolation methodology has been used. In this method, a serial number has been assigned to each time interval for a day and then multiplied the cumulative traded volume of immediate interval to total number of intervals and then divided by the serial number of respective interval. The calculated value is a proxy volume of that day on that time interval. Further, the proxy turnover of each interval is compared with the total turnover of base date i.e. 01 Jan 1997 and multiplied with 1000.

The proxy volumes are total volumes derived from extrapolating the cumulative volumes arrived upto the specified time interval. Thus, proxy volumes are not hypothetical figures but mirror image of total volumes derived from actual traded volumes upto the time interval. It is estimated by using the following steps:

- Cumulative traded volume has been calculated at each time interval by adding previous cumulative volume at last time interval and trading volume at immediate time interval.

Table 1 Cumulative Traded Volume

Timestamp	Traded Volume (in INR)	Cumulative Traded Volume (INR)
03/03/2014 09:10	1,013,428,572	1,013,428,572
03/03/2014 09:20	1,398,451,381	2,411,879,953
04/03/2014 09:10	1,239,487,687	1,239,487,687
04/03/2014 09:20	1,303,271,988	2,542,759,675

At 9:10 of 3<sup>rd</sup> March 2014, the traded volume was INR 1,013,428,572. Since, it was first trade of the day the cumulative traded volume is also the same. However, in next ten minutes, the total traded volume was INR 1,398,451,381 which subsequently added to the cumulative traded volume at 9:10. Hence, the cumulative traded volume has reached the level of INR 2,411,879,953. Similarly on 4<sup>th</sup> March 2014 at 9:10 AM, the traded volume was INR 1,239,487,687 which considered as cumulative traded volume. Since, it was traded volume of the first interval of the day. Thereafter in next ten minutes traded volume was INR 1,303,271,988 which again added back to the cumulative previous traded volume of the time interval.

- A serial number from 1 to 39 has been assigned to each time interval of daily turnover.

Table 2- Serial Wise Cumulative Traded Volume (In INR)

Sr. No.	Timestamp	Total Volume	Cumulative Traded Volume
1	03/03/2014 09:10	1,013,428,572	1,013,428,572
2	03/03/2014 09:20	1,398,451,381	2,411,879,953
3	03/03/2014 09:30	1,164,199,820	3,576,079,773
4	03/03/2014 09:40	990,528,275	4,566,608,048
-	-	-	-
-	-	-	-
38	03/03/2014 15:20	1,432,799,399	44,373,612,044
39	03/03/2014 15:30	1,534,539,895	45,908,151,940

In the above mentioned table, it is observed that each time interval has got serial number starting from 1 to 39 and as the time interval rises, the serial number increases.

- In next step, to calculate the proxy volume for the day has been calculated by using the following formula at each time interval:

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$(\text{Cumulative Traded Volume} * \text{Total Serial Number}) / \text{Immediate Serial Number}$

Table 3- Proxy Volume (In INR)

Sr. No.	Timestamp	Total Volume	Cumulative Traded Volume	Proxy Volume
1	03/03/2014 09:10	1,013,428,572	1,013,428,572	39,523,714,308
2	03/03/2014 09:20	1,398,451,381	2,411,879,953	47,031,659,084
3	03/03/2014 09:30	1,164,199,820	3,576,079,773	46,489,037,049
4	03/03/2014 09:40	990,528,275	4,566,608,048	44,524,428,468
-	-	-	-	-
-	-	-	-	-
38	03/03/2014 15:20	1,432,799,399	44,373,612,044	45,541,338,677
39	03/03/2014 15:30	1,534,539,895	45,908,151,940	45,908,151,940

Note: The total number of serial number would vary according to the number of time interval for the day.

Thereafter, the proxy volumes of each time interval were compared with the total turnover of base date and multiplied by 1000 to ascertain the volume index at each time interval of the day.

Table 4- Volume Index (VOX™)

Sr. No.	Timestamp	Cumulative Traded Volume (INR)	Proxy Volume (INR)	Volume Index (VOX™)
1	03/03/2014 09:10	1,013,428,572	39,523,714,308	4041.28
2	03/03/2014 09:20	2,411,879,953	47,031,659,084	4808.96
3	03/03/2014 09:30	3,576,079,773	46,489,037,049	4753.48
4	03/03/2014 09:40	4,566,608,048	44,524,428,468	4552.60
-	-	-	-	-
-	-	-	-	-
38	03/03/2014 15:20	44,373,612,044	45,541,338,677	4656.58
39	03/03/2014 15:30	45,908,151,940	45,908,151,940	4694.09

Base Year: 01 Jan 1997- Total Traded Value- INR 9.78 Billion

Base Year

A year from which the data is available related with price and volume of Nifty is considered as base year for the purpose of construction of volume based index. Therefore, here base date 01 Jan 1997 has been taken for calculating the index.

#### Formula

$$VOX^{TM} = (\text{Proxy Transaction Value for the Day} / \text{Base year's day transaction value}) * 1000$$

Similarly, the daily total turnover value has been collected for the period of 01 Jan 1997 to 01 June 2014. Further, the daily turnover is compared with the total turnover value of base date i.e. 01 Jan 1997 and multiplied by 1000 to ascertain the closing index value of each day.  
(Proxy Transaction Value for the Day/ Base year's day transaction value) \* 1000

$I_n$	= Number of time intervals i.e. respective serial number
Traded Volume	= Price of shares * number of shares traded
$V_n$	= Volume of respective intervals
$N$	= Total number of time intervals in a day
$B$	= Base year
$PV_n$	= Proxy volume of respective intervals

$$PV_n = \frac{\sum V_n * N}{I_n}$$

$$VOX^{TM} = PV_n * 1000 / B$$

## Research and Findings

The roots of this research dates back to a century old need of volume studies. Researchers and analysts have always given importance to the study of volume as a leading, lagging and sometimes as a coincident indicator for forecasting price direction or returns. In last so many decades the importance of volume was never undermined but the methodology to study volume was never standardized.

Our research aims to standardize the methodology to study the volumes (depth of the market) through an index named as Volume Index ( $VOX^{TM}$ ). Even though volume was always an important parameter of study, the creation of index for volumes has been held back due to the unique one sided step up pattern for intraday followed by a zero base opening figure. This aforesaid pattern brings a very wide gap between the previous close volume and next day opening. This unique nature of the variable (volume) has always posed a challenge to researchers and analysts in creating a volume based index. Keeping in view, this imperative need of volume studies in current market dynamics, we have attempted to adopt a unique methodology of creating an index through a unique concept of proxy volumes. This methodology has attempted to resolve the old complexities of volume data. It is well known that as the time rises in a trading day the total trading volume rises. As it is mentioned above that volume has a unique characteristic of one-sided step up, it is difficult to compare the volume at each time interval in a day.

### Empirical Analysis and Findings

1. Critical analysis of volume (cumulative traded volume) vis-à-vis volume index is done by taking two days sample data. The empirical findings clearly reflect the volume following a step up pattern with time during the trading day. It can be seen in Table 5 column 3, the cumulative traded volume starts from INR 2.71 billion and goes up to the INR 50.14 billion at the closing time of the market. The same reflection is observed on the second day where the cumulative traded volume starts from INR 1.97 Billion and closes at INR 46.94 Billion (refer Figure 1). The same pattern of volume is repeatedly visible on every trading day (refer Figure 2) reflecting the data for one month.

Looking at the VOX<sup>TM</sup> for the same period reflects a smoothing movement from a value 5407 to 5126 for day one and 3932 to 4799 on day two. It can be inferred from the index movement of day one that the momentum of volume change during the day has declined which was otherwise not visible in absolute volume data. The variation in absolute volume reflected in column 4 of Table 5 indicates a change of 80.50% in first ten minutes, which gets even out in the index to a change of 20.33%. The same effect is visible in the subsequent ten minutes time interval. Another important observation is the variation of previous day closing volumes and next day opening volumes in column 4 Table 5 which is -96.07%, the same gets evened out in the index to -23.29%. Thus the index serves the purpose of reading the volume change during intraday as well as inter-day on continued basis reducing the noise observed in absolute volume data.

Table 5 Sample of Cumulative Traded Volume and VOX for Two Days

Timestamp	Time	Cumulative Traded Volume (In INR Billions)	Change in Volume (%)	Volume Index (VOX™)	Change in VOX (%)
02/05/14	09:20:00	2.71	-	5,407	-
02/05/14	09:30:00	4.90	80.50%	6,507	20.33%
02/05/14	09:40:00	6.67	36.26%	6,650	2.19%
02/05/14	09:50:00	8.56	28.33%	6,827	2.66%
02/05/14	15:10:00	47.17	3.90%	5,083	1.09%
02/05/14	15:20:00	48.50	2.82%	5,089	0.11%
02/05/14	15:30:00	50.14	3.38%	5,126	0.73%
05/05/14	09:20:00	1.97	-96.07%	3,932	-23.29%
05/05/14	09:30:00	3.65	85.05%	4,851	23.36%
05/05/14	09:40:00	4.74	29.85%	4,724	-2.61%
05/05/14	09:50:00	6.12	29.03%	4,876	3.23%
05/05/14	15:10:00	44.20	3.54%	4,763	0.75%
05/05/14	15:20:00	45.53	2.99%	4,776	0.28%
05/05/14	15:30:00	46.94	3.11%	4,799	0.47%

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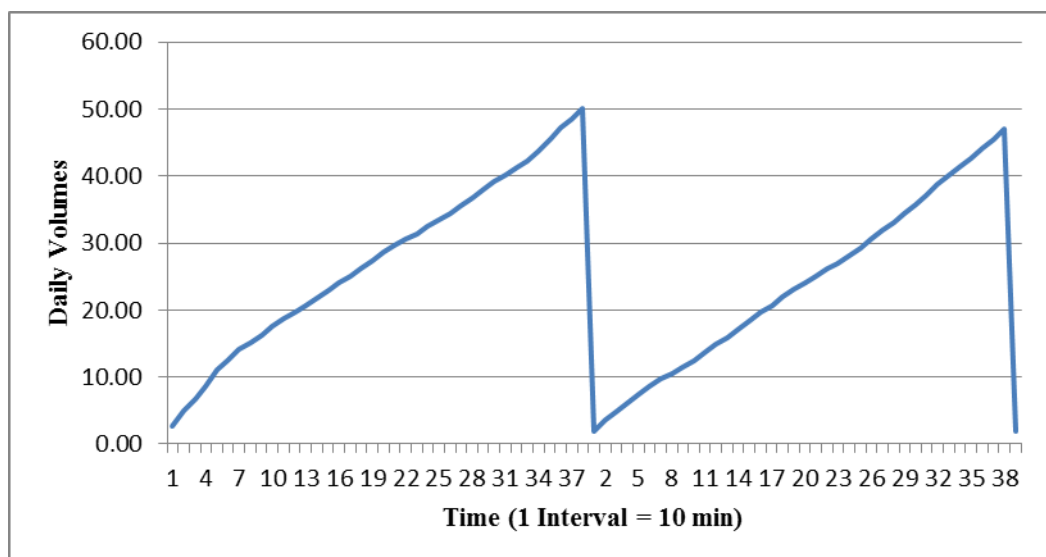


Figure 1- Cumulative Traded Volume for Two Days (In INR Billion)

2. An observation of one month data on cumulative traded volume (refer figure 2) reveals a spike pattern leading to a drop to “0” value on a daily basis. This pattern is formed on account of the reading methodology of volume with absolute data with span of one day only. As a traditional practice to study absolute volume, this spiked pattern has been a constraint to study volume momentum on intraday and inter-day. Researchers and analysts do volume analysis on a daily basis starting from value zero, thus leading to discontinued study. The volume index (VOX™) on the contrary reflects a continued value linked to the actual volumes but normalized to the base value (volumes on the base date, in this case 01 January 1997). The index values can be observed for the similar period in Figure 3 highlighting, a continued and normalized volume studies.

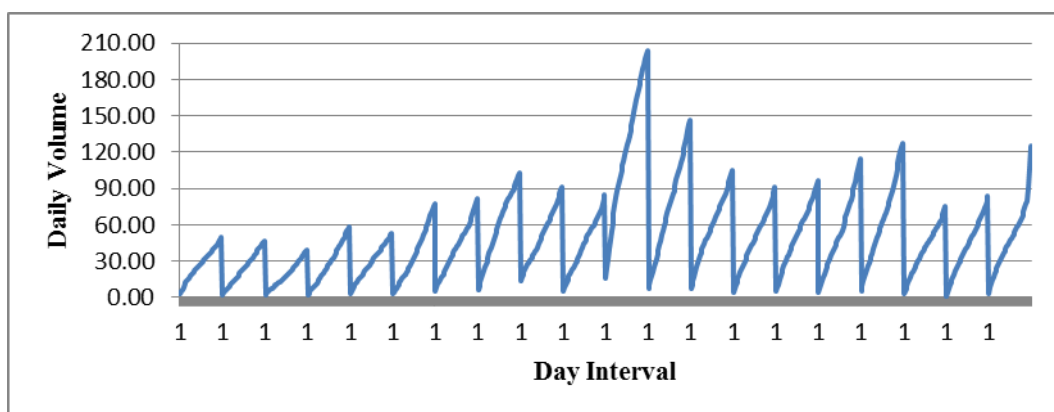


Figure 2 - Cumulative Traded Volumes for a Month (In INR Billion)

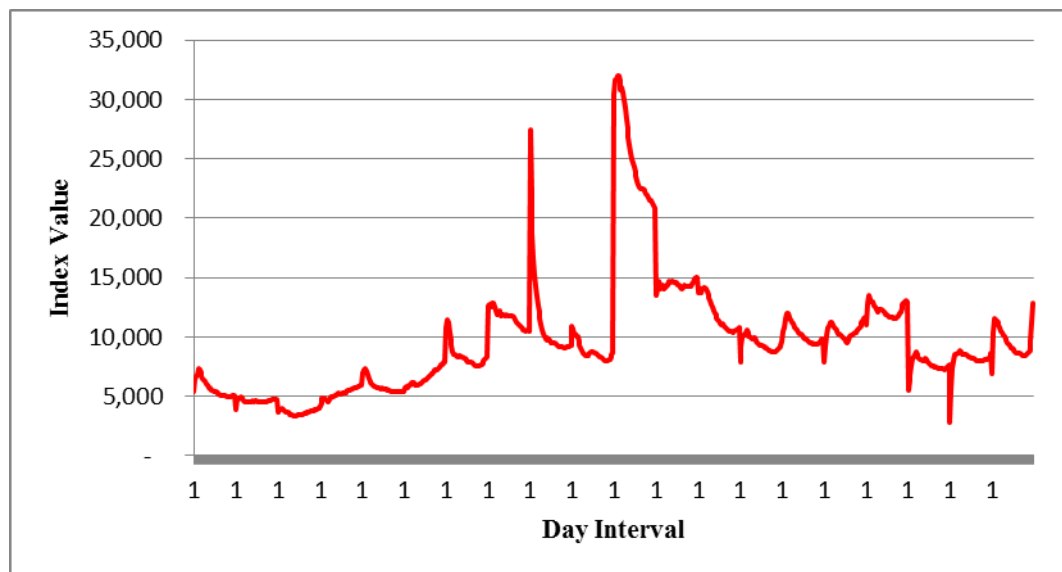


Figure 3- Volume Index (VOX™)

3. By superimposing the Volume Index (VOX™) on the absolute volume data (refer Figure 4) a comparison can be drawn on various facets of volume studies. The volume index is observed to follow a continuous pattern starting from 6507 (in the selected time frame) going up to 13683 without touching zero value as visible in absolute volume data. It can also be observed that volume index is reflecting a smoothing effect of actual volume movement. The index can be used to study the momentum of volumes even on short intervals during the day. The most important of all these observations is statistically tested perfectly positive correlation of absolute volume and volume index (VOX™) (refer Figure 5).

## THE NEED AND IMPORTANCE OF A VOLUME BASED INDEX

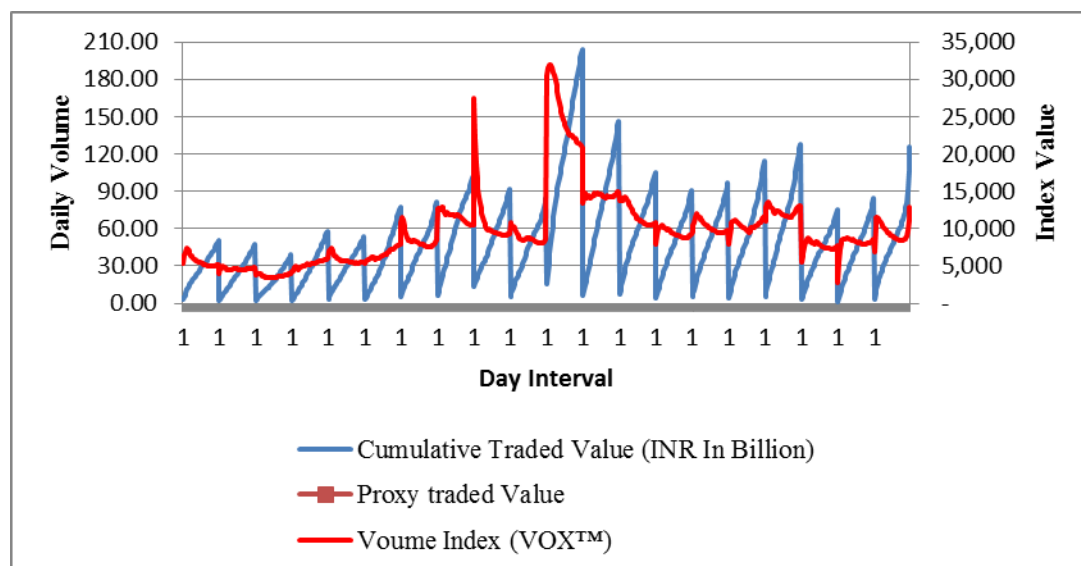


Figure 4 – Volume Index Superimposed on Absolute Volume

4. Last 17 years comparison of absolute volume and volume index (VOX™) confirms volume index as true reflector of volumes supported by statistical analysis of correlation turning perfectly positively correlated ( $r = +1$ ). The same can be observed in Figure 5. The index with its base value of 1000 (Base year 1997) turns 13683 in month ending May 2014. Thus indicating market depth increase by 13.68 times in the span of 17 years (refer Table 6). These indications can be further used researchers, analysts and policy makers to draw meaning conclusions for the market.

Table 6- Volume Index Perfectly Replicating the Absolute Volume Change

Date	Traded Value (in INR Billions)	Change in Turnover (Times)	Volume Index (VOX™)	Change in VOX (Times)
01-Jan-97	9.78	-	1000.00	-
29-May-14	133.85	13.68	13,683.33	13.68

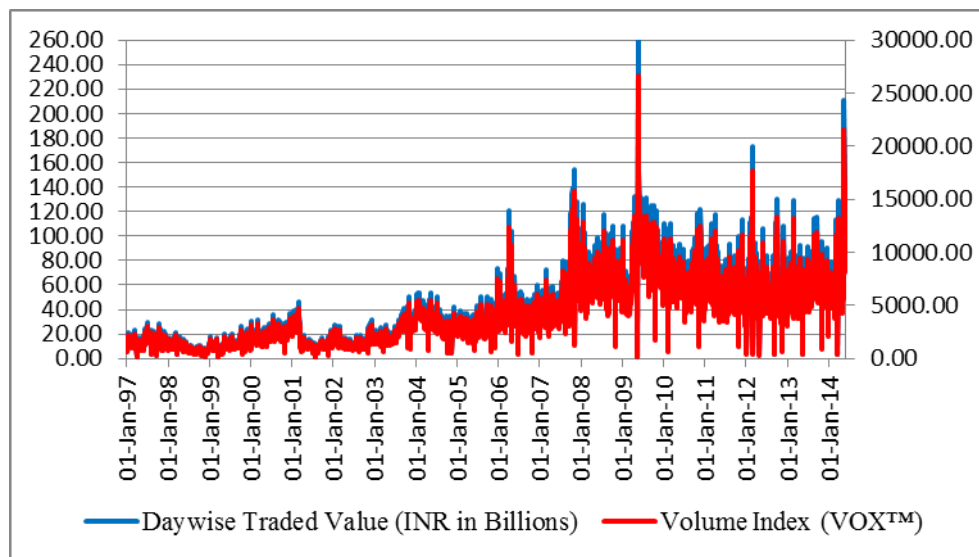


Figure 5- Volume Index Perfectly Replicating the Absolute Volume Change

5. There are various literatures that support the argument of volumes follows the asymmetric pattern (Kyle 1985 and Admati and Priederer, 1988). Henry and McKenzie (2006) also found the relationship between volume and volatility is asymmetric. The same is observed in intraday as well as in inter-day pattern of volumes movement in our research.

A sharp movement is observed at the opening time of the market in all days. Later, the same index moves smoothly except in day 3 (refer figure- 6, 7, 8, 9, 10 and 11).

In figure 8, a sharp rise is observed at starting time, the index moves up from 3720 to 4010, and then it started moving down and reached at lowest level of the day at 3378. From the lowest level, it again started rising and closed at 4017. Index varied 15.91% in intraday from high to low. The same pattern of abrupt movement is also observed in five days inter-day graph (refer figure 12). The five days variation at high and low level was 36%. Index from 5142 to 4990 from day 1 to day 2, further it went down with 14.60% to 4262 in day 3. In day 4, it showed a sharp rise of 56% and reached the level of 6658 and further it went down to 5534 and registered 17% negative growth. The same asymmetric movement is also observed in intraday graphs.

## THE NEED AND IMPORTANCE OF A VOLUME BASED INDEX

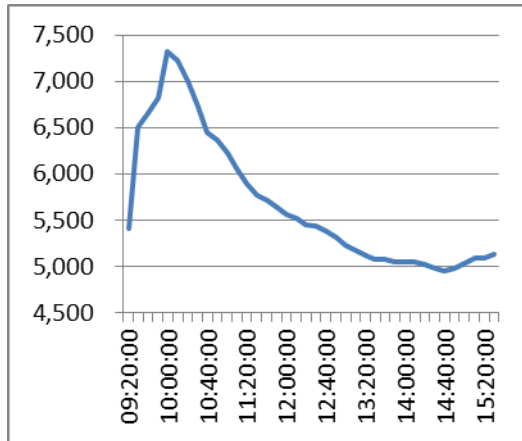


Figure 6- Volume Index (Day-1)

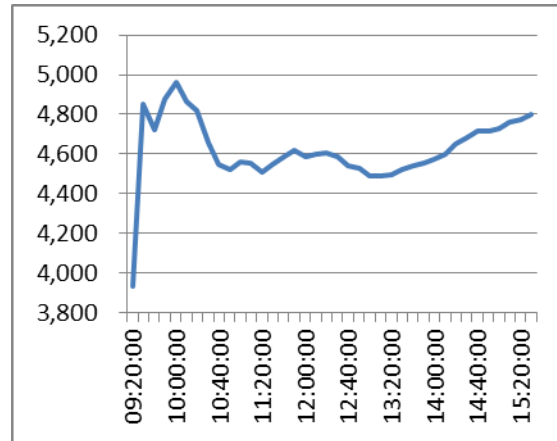


Figure 7- Volume Index (Day-2)

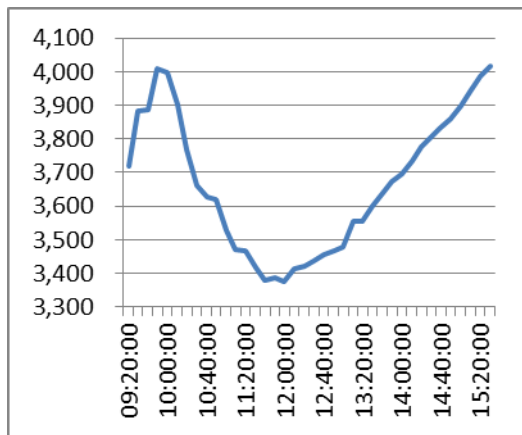


Figure 8- Volume Index (Day-3)

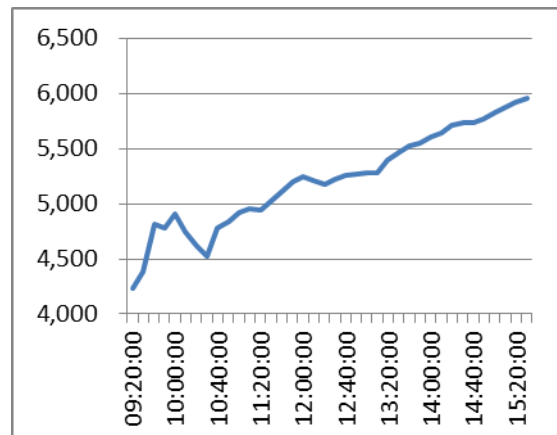


Figure 9- Volume Index (Day-4)

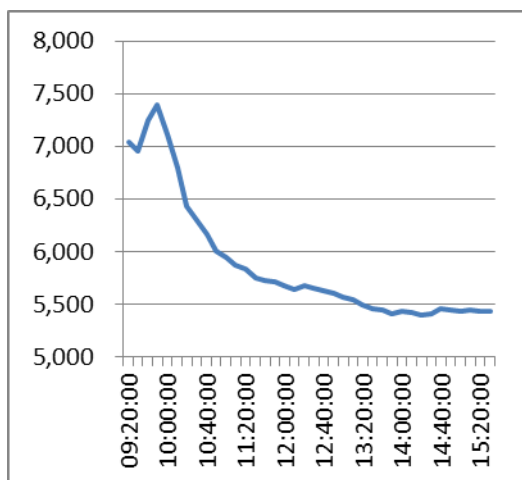


Figure 10- Volume Index (Day-5)



Figure 11- Volume Index (All five days at intraday level)

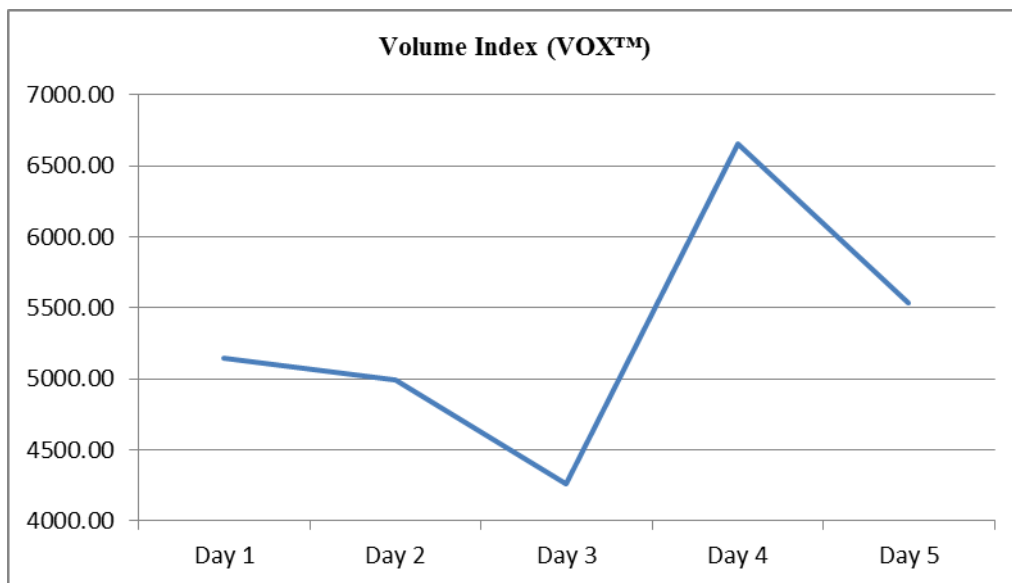


Figure 12- Volume Index (Inter Day for five days)

6. Though the volume index represents proxy volumes during the entire day, the unique methodology adopted in this index converges the proxy volumes towards actual volumes with time and gets equated to exact volumes on the closing time. Thus, the volume index turns a true reflector of volume at the market closing hours.

### Limitations

- The variability in the indices is higher due to two reasons (1) Call Auction (2) Magnified effect of extrapolation of proxy volumes.
- The volume index designed here reflects the changes in volume only for large cap stocks represented by broad based market index (NIFTY). It does not reflect volume changes across other market segments such as mid cap, small cap, and sector specific.
- The index does not distinguish traded volumes in regular market vis-à-vis negotiated trade done for executing corporate actions or strategic decisions such as mergers, acquisitions, take over, spin-offs, bonus, splits, reverse splits, rights block trades and offer for sale (OFS), etc.
- The index does not reflect a true picture of market wide participation i.e. it does not distinguish concentrated trades coming from institutions or cartels with trades coming from retail segment.
- The index has also limitation of not reflecting the market depth during call auction process at the beginning of the market known as pre-opening session in India and post trading session of the market.

### Potential Uses of VOX™

Volume index (VOX™) will be helpful for the overall market in taking appropriate decisions and would open a plethora of uses for the regulators, exchanges, brokers, consultants, analyst, traders and investors.

Volume index (VOX™) would also act as a guiding tool for regulators and watchdogs to frame or modify rules, regulation and policies pertaining to capital market to make the market more efficient. Researchers and academicians can read the growth of the stock markets and compare the efficiency of the financial markets of different countries.

Volume index (VOX™) would act as a depth indicator facilitating investment decisions for global investors, large size fund and even sovereign funds. Breadth and depth studies form an integral part of market analysis. It would be instrumental in studying, the most intricate financial process i.e. fund shifting process across asset classes and fund shifting process across currencies. It can be further used to estimate and mitigate liquidity risk.

## Conclusion

The concept of volume index has been tested with Indian market data. However, volume studies are omnipresent and universal, thus leading to a universally acceptable tool for all markets across the world.

With all the ardent care taken in creating this volume index (VOX<sup>TM</sup>), we have identified this as a beginning of new horizons for dynamic indices. Our study would leave a noose for researchers world-wide to think beyond the small hurdle that was holding us back for more than a century. The limitations discussed above lead a scope for designing new variants of VOX<sup>TM</sup> on mid cap, small cap and sectors etc. We hope the world would find volume index as an important tool not only to study volumes but indirectly to facilitate the study of market direction and other important relationship like valuations and volatility. Our research aims laying down foundation for more innovative indexes in complex market scenarios anticipated in decades ahead.

*Our end is our beginning...*

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## List of Abbreviations

OBV	: On-balance volume
A/D	: Accumulation/Distribution
MFI	: Money Flow Index
S&P 500	: Standard & Poor 500 Index
Nifty	: NSE(National Stock Exchange) Fifty Index
VIX	: Volatility Index
LIX	: Liquidity Index
VOX <sup>TM</sup>	: Volume Index
OFS	: Offer for Sale

## DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

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**Abstract:** *Basel accord on capital adequacy norms for financial and banking sector has included operational risk as a specific risk for which separate capital has to be provided. The major problem with any model of operational risk is that these data are inadequate. If subjective choice or prior belief on model parameters is to influence our estimate, one must employ Bayesian analysis. BBNs lend themselves to scenario analysis; with scenario analysis, one can calibrate one or more causal risk factors in the network and analyze its impact on the loss estimate. Moreover BBNs are causal networks and are particularly useful for analyzing causes that contribute to operational risks. Under causal analysis, new evidence of operational losses is used to calculate updated probabilities (also referred to as posterior probabilities) of all the causal factors. The Bayesian process of statistical estimation is one of continuously revising and refining our subjective beliefs about the state of the world as more data become available. In this regard, present research has been undertaken to carry on to develop a possible operational risk measure for banking activities. This model indicates a development plan which includes access to loss data central/banks are in possession of; and advice/deliberations from BIS/central/relevant bank authorities on construction of model (BBN) architecture through appropriate questionnaire and collection of relevant qualitative data.*

**Keywords:** *Operational Risk Measure, Bayesian Probabilistic Network, BBN, scenario analysis, causal analysis*

### Introduction

Basel accord on capital adequacy norms for financial and banking sector has included operational risk as a specific risk for which separate capital has to be provided. One of the requirements for designing a risk management model that would adequately explain the operational risk faced by the bank, and consequently provide capital to face the risk, is collection of loss data. The major problem with any model of operational risk is that these data are inadequate. Without a credible loss history database, most of the advanced risk analysis and measurement techniques cannot be implemented.

Baysian Belief Networks or BBNs provide an elegant solution to this problem. They combine both qualitative and quantitative information for arriving at loss estimates. BBNs are causal networks and are particularly useful for analyzing causes that contribute to operational risks. As with scenario Analysis, one can calibrate one or more causal risk factors in the network and analyze its impact on the loss estimate, under causal Analysis, new evidence of operational losses is used to calculate updated probabilities (also referred to as posterior

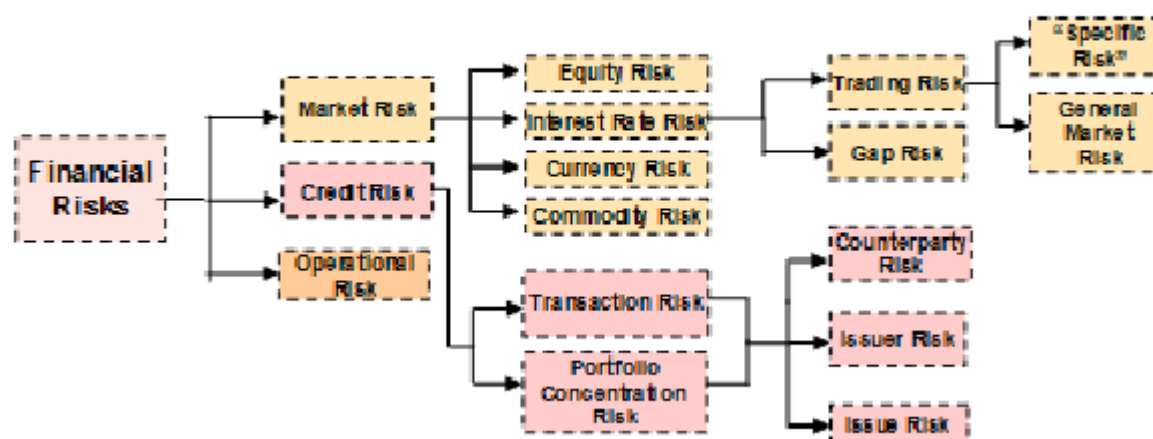
## DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

probabilities) of all the causal factors. The Bayesian process of statistical estimation is one of continuously revising and refining our subjective beliefs about the state of the world as more data become available.

The fundamental objective of the Basel Committee on Banking Supervision has been to develop a framework that would strengthen the soundness and stability of the international banking system. The Committee believes that the framework and its subsequent revisions will promote the adoption of stronger risk management practices by the banking industry, and views this as one of its major benefits of the Basel Committee on Banking Supervision

The Committee recognizes the following hierarchy of financial risks:

Table 1 : Hierarchy of Financial Risk



A glossary of different risks is given in the Appendix.

Table 2: Basel Capital Accord – brief history

Basel 1	Basel 1.5	Basel 2	Basel 3
Proposed: 1986	Proposed: 1993	Proposed: 1999	Proposed: 2010-11
Effective: 1988	Effective: 1998	Effective: 2007	Effective: 2013-2018
Credit Risk	Credit Risk + Market Risk	Credit Risk (Enhanced) + Market Risk (No Change) + Operational Risk (New)	Credit Risk + Market Risk + Operational Risk

#### Basel III

- To avoid the repeat of 2008 that brought the global economy to its knees, basel committee on banking supervision (bcbs) and the financial stability board (fsb) suggested a revised framework for capital adequacy ratio. As such, basel iii (or the third basel accord) is a global regulatory standard on bank capital adequacy, stress testing and market liquidity risk agreed upon by the members of the basel committee on banking supervision in 2010–11, and scheduled to be introduced from 2013 until 2018. Basel iii strengthens bank capital requirements and introduces new regulatory requirements on bank liquidity and bank leverage.
- The OECD estimates that the implementation of basel iii will decrease annual GDP growth by 0.05–0.15%. Critics suggest that greater regulation is responsible for the slow recovery from the late-2000s financial crisis,
- The underlying rationale is to insulate banks from adverse shocks by increasing the amount of capital (own funds) they hold on their books compared to deposits and other borrowings

## DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

The basic approach of this capital adequacy framework is that a bank should have sufficient capital to provide a stable resource to absorb any losses arising from the risks associated with in its business.

Basel accord on capital adequacy norms for financial and banking sector has included operational risk as a specific risk for which separate capital has to be provided. Operational risks include many different types of risks, from the simple operations risks of transactions processing, unauthorised activities and system risks to other types of risks that are not included in market or credit risk: human risk, legal risk, information risk.

One of the requirements for designing a risk management model that would adequately explain the operational risk faced by the bank, and consequently provide capital to face the risk, is collection of loss data. The accord recognises that the banks may require using external data to supplement their internal data so that the banks recognise such risks which a specific entity might not have experienced but has been faced by other banks. The available commercial database have been developed for European and US based banks where the threshold for reporting a loss event is USD 1 Million, which is too high for most of the Indian banks and others from various countries, particularly in the sub-continent..

### Review of Background

The scale and persistence of the credit crisis showed that excessive leverage and unfettered financial innovation - together with improvident credit origination, inadequate valuation methods can escalate market disruptions with adverse consequences for financial stability and economic growth.

An analysis of credit crisis and the failure of financial organisations across the globe makes it apparent that underlying their failure were improperly managed operational risks. Increasing complexity of banking & financial products, dependence on technology and rapid expansion of bank operations, increasing vulnerability of financial institutions, poor modeling were amongst the causes of this meltdown. All these causes have a striking resemblance with Operational Risk events. Three major observations are noted.

1. The need for operational risk management is widely recognized by institutions on a global basis. Laker, in his Chairman's Speech at Australian Prudential Regulatory Authority, in September, 2006, argues that greater complexity of banking activity and increasing dependence on technology and specialist skills has made operational risk as one of the most important risk facing banking institutions of which outsourcing and technology risk are two major sources of operational risk.
2. Operational risk is not a new risk but it is being increasingly realized by the bankers that many losses earlier described as credit or market risk, were in fact due to failing operational or internal processes. Wei R, Cummins J D, and Lewis C in (Journal of Banking and Finance, 2006, 30 (1): 2605–2634.) and Wei R in (the Wharton School working paper, 2006) examined that declines in market value due to announcement of operational loss events were of a larger magnitude than the operational losses causing them.
3. Skinner, in (IT Week, 2008), asserts that the growth and survival of firms amidst intense competition depends upon the management and control of operational risks.

So a holistic operational risk measure and hopefully an effective risk management program is urgently needed.

### *Operational Risk structure*

Let us take a look at the Operational Risk structure as BIS defines it.

Operational risk, as BIS puts it, is the risk of loss resulting from

1. inadequate or failed internal processes,
2. people and systems or
3. external events.

Operational risks include many different types of risks, from the simple operations risks of transactions processing, unauthorised activities and system risks to other types of risks that are not included in market or credit risk, such as human risk, legal risk, information risk.

Table 3: Operational Risk Structure

Cause Level 1	Cause Level 2
People	Employee Fraud/ Malice(criminal)
	Unauthorised Activity/ Rogue Trading/Employee Misdeed
	Employment Law
	Workforce Disruption
	Loss or Lack of Key Personnel
Process	Payment/Settlement Delivery Risk
	Documentation or Contract risk
	Valuation/Pricing
	Internal/External Reporting
	Compliance
	Project Risk/Change Management
	Selling Risks
Systems	Technology Investment Risk
	System Development and Implementation
	Systems Capacity
	Systems Failure
	System Security Breach ~
	Legal/Public Liability

## DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

Cause Level 1	Cause Level 2
External	Criminal Activities
	Outsourcing/Supplier Risk
	In-sourcing risk
	Disaster and Infrastructural Utilities Failure Risk
	Regulatory Risk
	Political/Government Risk

BIS has identified eight different business lines, viz. (1) Corporate finance, (2) Trading & Sales, (3) Retail Banking, (4) Commercial Banking, (5) Payment & Settlement, (6) Agency Services, (7) Asset Management and (8) Retail Brokerage. These business lines have further been mapped across various activities. This mapping chart can be used to group various activities for computation of regulatory capital to be provided for operational risk of one category or another, or even a group of categories, which we will come to later.

Table 4: Business Lines

Level 1	Level 2	Activity Groups
Corporate Finance	Corporate Finance	Mergers and acquisitions, underwriting, privatizations, securitization, research, debt (government, high yield), equity, syndications, IPO, secondary private. placements
	Municipal Government Finance	
	Merchant Banking	
	Advisory Services	
Trading & Sales	Sales	Fixed income, equity, foreign exchanges, commodities, credit funding, own position securities, lending and repose, brokerage, debt, prime brokerage
	Market Making	
	Proprietary Positions	
	Treasury	
Retail Banking	Retail Banking	Retail lending and deposit, banking services, trust and estates
	Prime Banking	Private lending and deposit. banking services, trust and estates
	Card Services	Merchant/commercial/corporate card, private labels and retail
Commercial Banking	Commercial Banking	Project finance, real estate, export finance, trade finance, factoring, leasing, lending, guarantees, bill of exchange
Payment and	External Clients	Payment and Collections, funds transfer, clearing and

Level 1	Level 2	Activity Groups
Settlement		settlement
Agency services	Custody	Escrow, depository receipts, securities lending (customers) corporate actions
	Corporate Agency	Issuer and paying agents
	Corporate Trust	
Asset Management	Discretionary Fund	Pooled, segregated, retail, institutional, closed, open,
	Management	private equity
	Non-Discretionary Fund Management	Pooled, segregated, retail, institutional, closed, open, *
Retail Brokerage	Retail Brokerage	Execution and full service

Similar to classification of business lines, BIS has also classified Loss Types or Risk Categories. In all, seven types of loss events have been identified, viz. (1) internal fraud, (2) external fraud, (3) employment practices and workplace, (4) clients, products and Business Practices, (5) Damages to Physical Assets, (6) Business Disruption and System Failures and (7) Execution, Delivery and Process management; these loss types have been further classified into numerous distinct categories.

#### *BIS Approaches for Capital Cover*

Based on the original Basel Accord, banks using the basic indicator approach must hold capital for operational risk equal to the average over the previous three years of a fixed percentage of positive annual gross income. Figures for any year in which annual gross income is negative or zero should be excluded from both the numerator and denominator when calculating the average.

*The fixed percentage 'alpha' is typically 15 percent of annual gross income*

Under the Standardised Approach, for each of the eight business lines business line, gross income is used as a broad indicator that serves as a proxy for the scale of business operations and thus the likely scale of operational risk exposure within each of these business lines. The capital charge for each business line is calculated by multiplying gross income by a factor (denoted beta) assigned to that business line.

## DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

Business Line	Beta Factor
Corporate finance	18%
Trading and sales	18%
Retail banking	12%
Commercial banking	15%
Payment and settlement	18%
Agency services	15%
Asset Management	12%
Retail Brokerage	12%

The total capital charge is calculated as the three-year average of the simple summation of the regulatory capital charges across each of the business lines in each year. In any given year, negative capital charges (resulting from negative gross income) in any business line may offset positive capital charges in other business lines without limit

In addition to Basic indicator approach & Standardized approach, there is provision in BIS accord for Advanced Measurement Approach (AMA). Under this approach the regulatory requirement will be measured by the risk measure generated by the internal operational risk measurement system of the bank, using specific quantitative and qualitative criteria. According to the BCBS Supervisory Guidelines, an AMA framework must include the use of four data elements: (i) Internal loss data (ILD), (ii) External data (ED), (iii) Scenario analysis (SBA), and (iv) Business environment and internal control factors (BEICFs). Use of the AMA is subject to supervisory approval.

### Rationalisation for Bayesian Network

As mentioned above, there are numerous categories of operational risk and within each category there are many different types of data requirements.. Qualitative data include questionnaires for self-appraisal or independent assessments as well as risk maps of the causal factors in process flows. Quantitative data include direct and indirect financial losses, errors and other performance indicators, risk ratings etc. The major problem with any model of operational risk is that these data are inadequate.

The inadequacy of the data means that subjective choice is much more of an issue in operational risk than it is in market or credit risk measurement. If subjective choice or prior belief on model parameters is to influence our estimate, one must employ Bayesian analysis.

Without a credible internal loss history database, most of the advanced risk analysis and measurement techniques (e.g. Loss distribution approach) can not be implemented. The Basel defined requirements are fairly stringent –organizations need to have at least three years (preferably five) of operational loss history. Most banks & financial institutions are not likely to have this historical data, esp. for some business-risk category combinations.

Bayesian Belief Networks or BBNs provide an elegant solution to this problem. They combine both qualitative and quantitative information for arriving at loss estimates. They are

particularly appropriate for modelling operational risks with little or no historical losses – most low frequency-high severity operational losses fall in this category.

### *Bayes' Rule*

The cornerstone of Bayesian methods is the theorem of conditional probability of events X and Y:

$$\text{prob}(X \text{ and } Y) = \text{prob}(X|Y) \text{prob}(Y) = \text{prob}(Y|X) \text{prob}(X)$$

This can be re-written in a form that is known as Bayes' rule, which shows how prior information about Y may be used to revise the probability of X:

$$\text{prob}(X|Y) = \text{prob}(Y|X) \text{prob}(X) / \text{prob}(Y)$$

### Prior Beliefs, Sample Information and Posterior Densities

When Bayes' rule is applied to distributions about model parameters it becomes:  
 $\text{prob}(\text{parameters} | \text{data}) = \text{prob}(\text{data} | \text{parameters}) * \text{prob}(\text{parameters}) / \text{prob}(\text{data})$

The unconditional probability of the data 'prob(data)' only serves as a scaling constant, and the generic form of Bayes' rule is usually written

$$\text{prob}(\text{parameters} | \text{data}) \propto \text{prob}(\text{data} | \text{parameters}) * \text{prob}(\text{parameters})$$

Prior beliefs about the parameters are given by the prior density 'prob(parameters)' and the likelihood of the sample data 'prob(data | parameters)' is called the sample likelihood. The product of these two densities defines the posterior density 'prob(parameters | data)', that incorporates both prior beliefs and sample information into a revised and updated view of the model parameters, as depicted in figure 1.

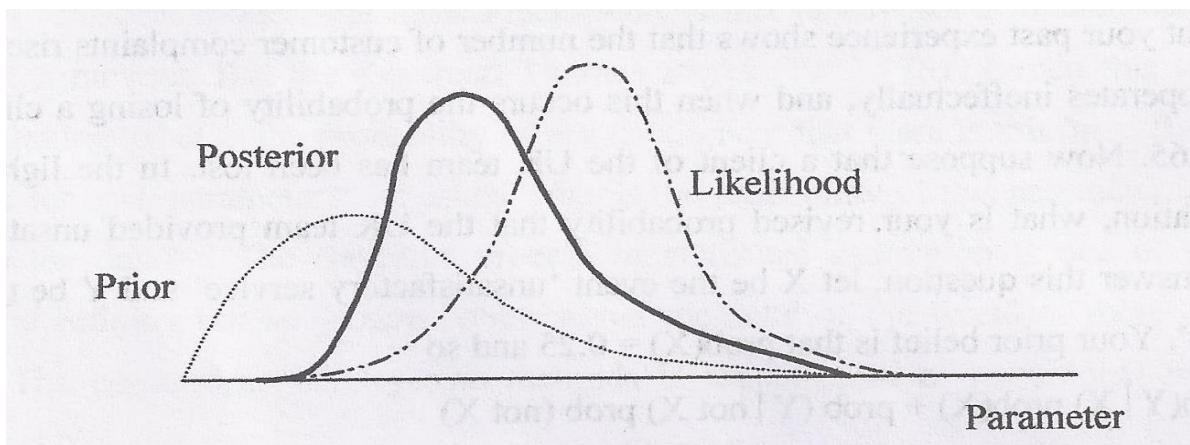


Figure 1: The Posterior density is a product of the prior density and the sample likelihood

If prior beliefs are that all values of parameters are equally likely, this is the same as saying there is no prior information. The prior density is just the uniform density and the posterior density is just the same as the sample likelihood. But more generally the posterior density has a lower variance than both the prior density and the sample likelihood. The increased accuracy reflects the value of additional

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information, both subjective as encapsulated by prior beliefs and objective as represented in the sample likelihood.

Figure 2 shows two posterior densities based on the same likelihood.

Subjective beliefs may have a great influence on model parameter estimates if they are expressed with a high degree of confidence. In figure 2a, where prior beliefs are expressed with a high degree of confidence, the posterior density is much closer to the prior density and parameter estimates will be much influenced by subjective prior beliefs. But in figure 2b prior beliefs are rather uncertain, represented by the large variance of the prior density. So the posterior density is close to the sample likelihood and prior beliefs have little influence on the parameter estimates.

(a)

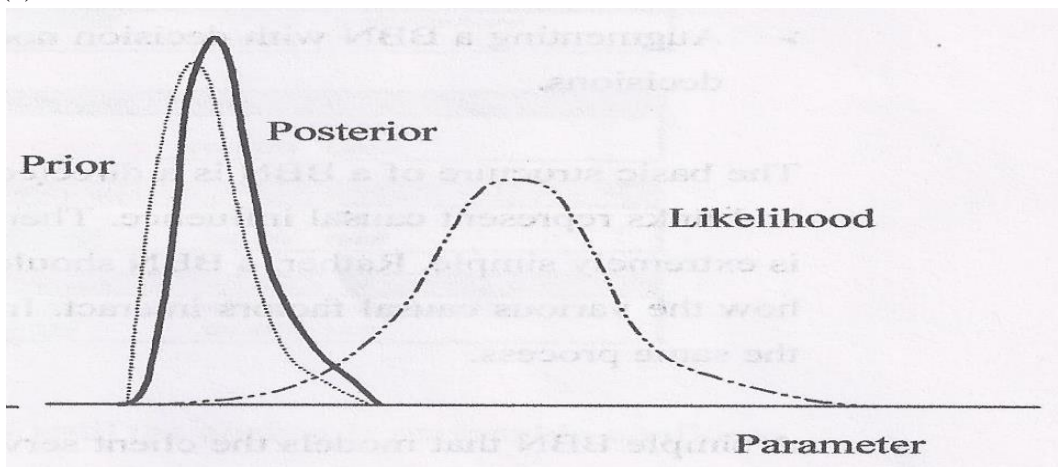
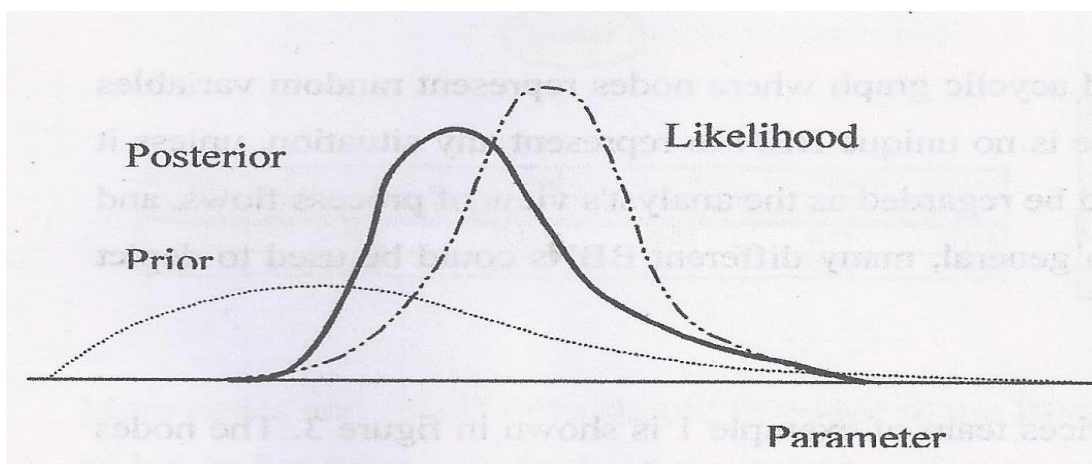


Figure 2: the posterior density for (a) confident prior beliefs , and (b) uncertain prior beliefs

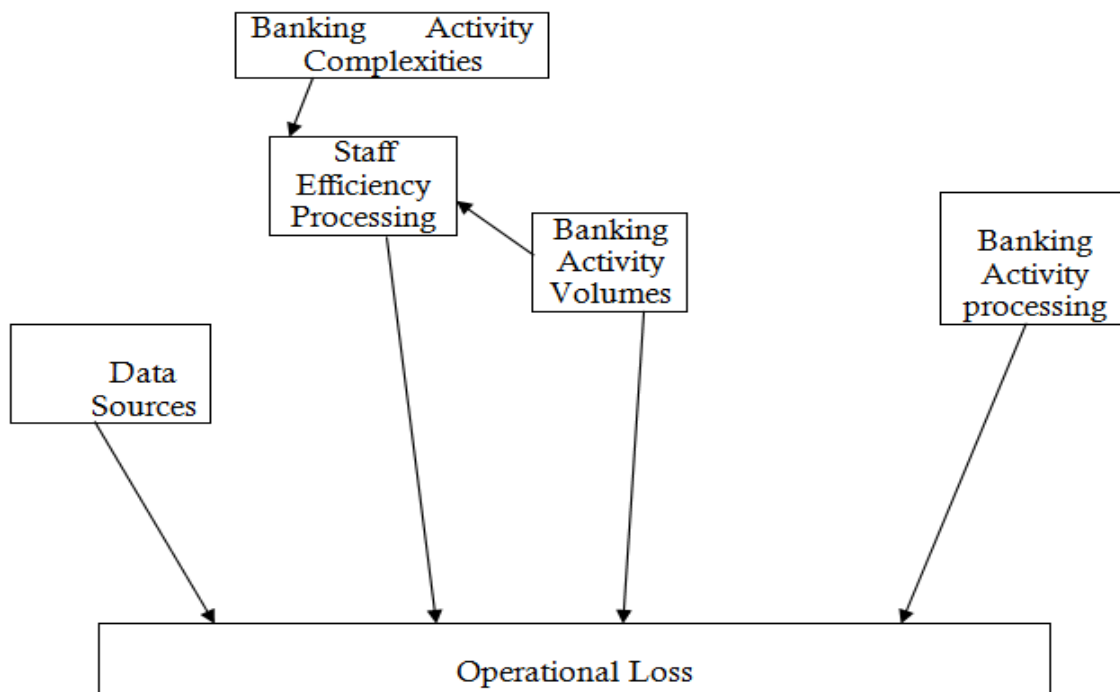
(b)



The basic structure of a BBN consists of nodes that represent random variables and links that represent causal influence. A BBN is to be regarded as the analyst's view of process flows and how the various causal factors interact; and it is to be noted, therefore, that there is no unique BBN to represent any situation.

We attempt to illustrate, at the risk of over-simplification, a reference implementation of a BBN with an application to some banking activity under a particular business line which has faced or been subjected to risk category(ies)/loss type(s); the implementation may be for a specific risk category, the technique can be extended to any other category as well. The illustration uses a skeletal pilot with qualitative data (based on appropriate questionnaire/self-assessment) and limited quantitative data on losses.

Table 6: Bayesian network for some Banking Activity under a particular business line which has faced or been subjected to Risk Category(ies)/loss type(s)



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## Analysis and Discussion:

Data Sources	Probability	BA complexity	Probability	BA volumes	Probability
Good	0.70	Low	0.80	Low	0.30
Bad	0.30	High	0.20	High	0.70

BA Processing System	Probability	BA complexity		Low		High	
Good	0.70	BA Volumes		Low	High	Low	High
Bad	0.30	Efficiency	Low	0.25	0.40	0.40	0.55
			High	0.75	0.60	0.60	0.45

Processing	Good				Bad			
Staff Efficiency	Low		High		Low		High	
Data Sources	Good	Bad	Good	Bad	Good	Bad	Good	Bad
Losses 0-1 million	50	20	60	30	30	10	50	20
1-2 million	30	50	30	40	40	50	40	50
2-3 million	20	30	10	30	30	40	10	30

VOLUMES LOW

Processing	Good				Bad			
Staff Efficiency	Low		High		Low		High	
Data Sources	Good	Bad	Good	Bad	Good	Bad	Good	Bad
Losses 0-1 million	40	10	50	20	20	10	30	10
1-2 million	40	60	40	50	50	40	50	50
2-3 million	20	30	10	30	30	50	20	40

VOLUMES HIGH

Calculated Efficiency	Staff	Percentage
Low		38.5
High		61.5

Operational loss in US \$	Percentage
0-1 million	37.58
1-2 million	39.83
2-3 million	22.60

Expected loss:  $(0.5 \times 0.3758) + (1.5 \times 0.3983) + (2.5 \times 0.2260) = 0.1879 + 0.59745 + 0.565$   
 $= \$ 1.35035$

[illegible]

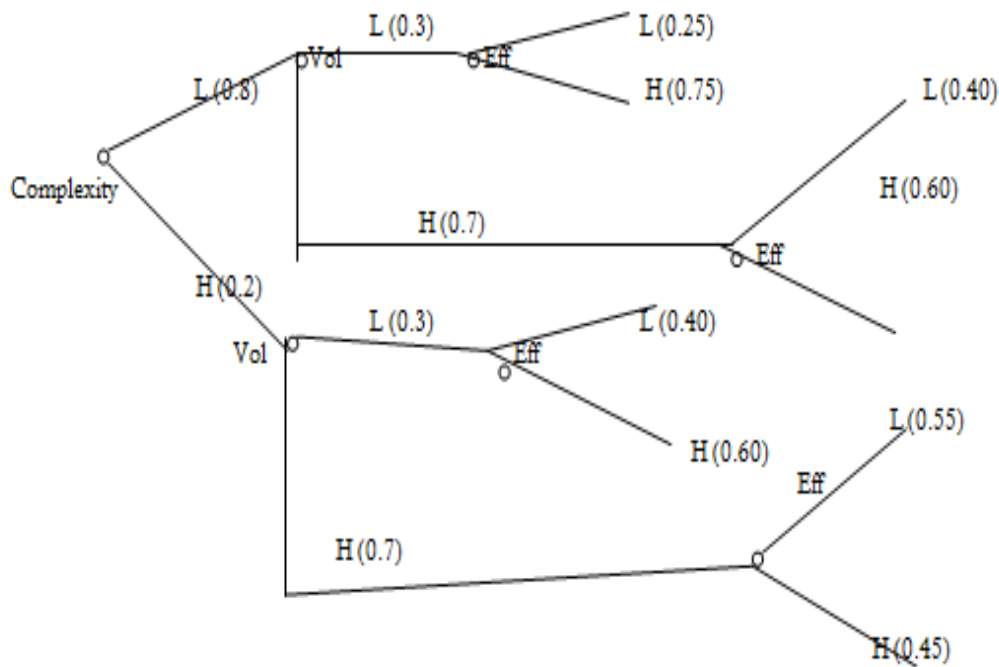


Figure 4: Staff efficiency

BBNs lend themselves to scenario analysis; with scenario analysis, one can calibrate one or more causal risk factors in the network and analyze its impact on the loss estimate. For example, an operations manager might be interested in estimating operational losses under heavy processing volumes (all other conditions remaining unchanged).

Moreover BBNs are causal networks and are particularly useful for analyzing causes that contribute to operational risks. Under causal analysis, new evidence of operational losses is used to calculate updated probabilities (also referred to as posterior probabilities) of all the causal factors. In other words, additional loss information is propagated to all the nodes in the network. This technique of evidence (new loss data) propagation is extremely useful for analyzing the causes that impact operational losses.

The Bayesian process of statistical estimation is one of continuously revising and refining our subjective beliefs about the state of the world as more data become available.

There are several software packages for Bayesian Networks that are freely downloadable from the Internet. We have used Hugin- Lite software here pages

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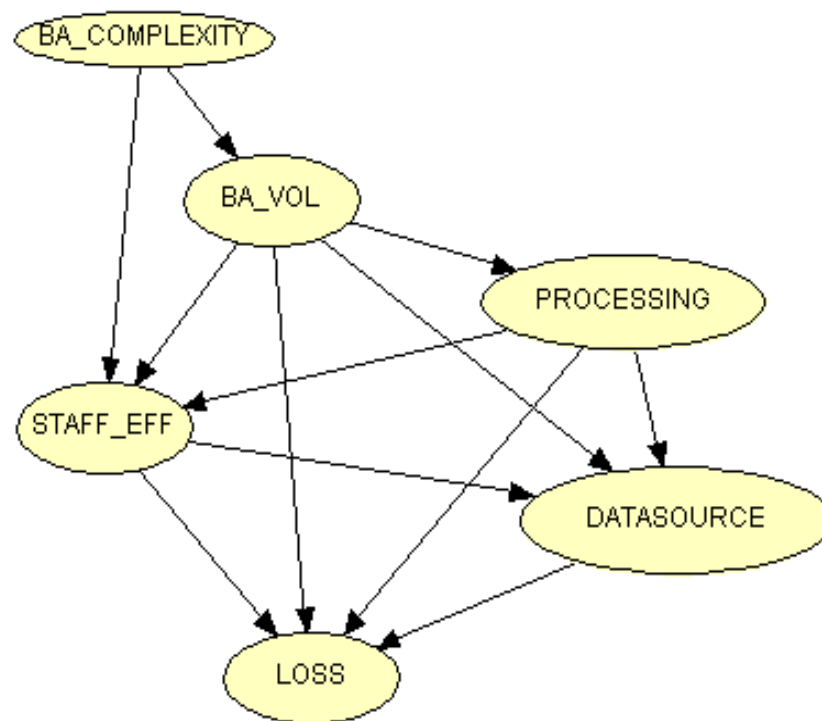


Figure 5 : Bayesian Network

Nodes represent causal variables and links represent causal influence

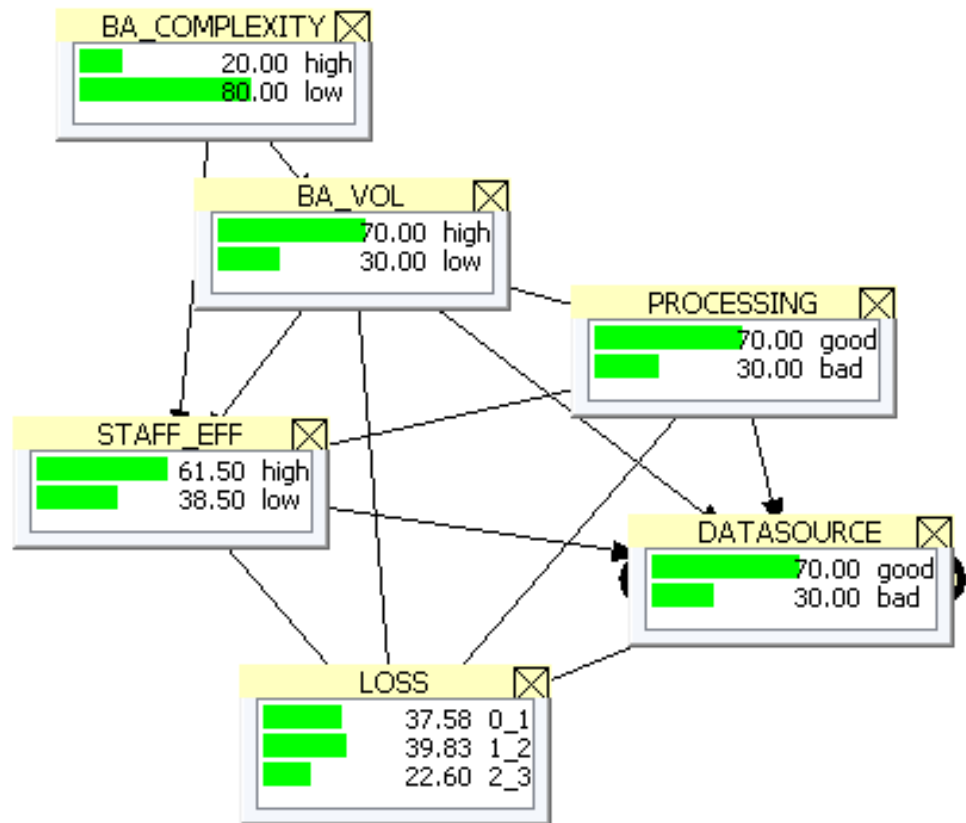


Figure 6 : Hugin- Lite Output

# DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

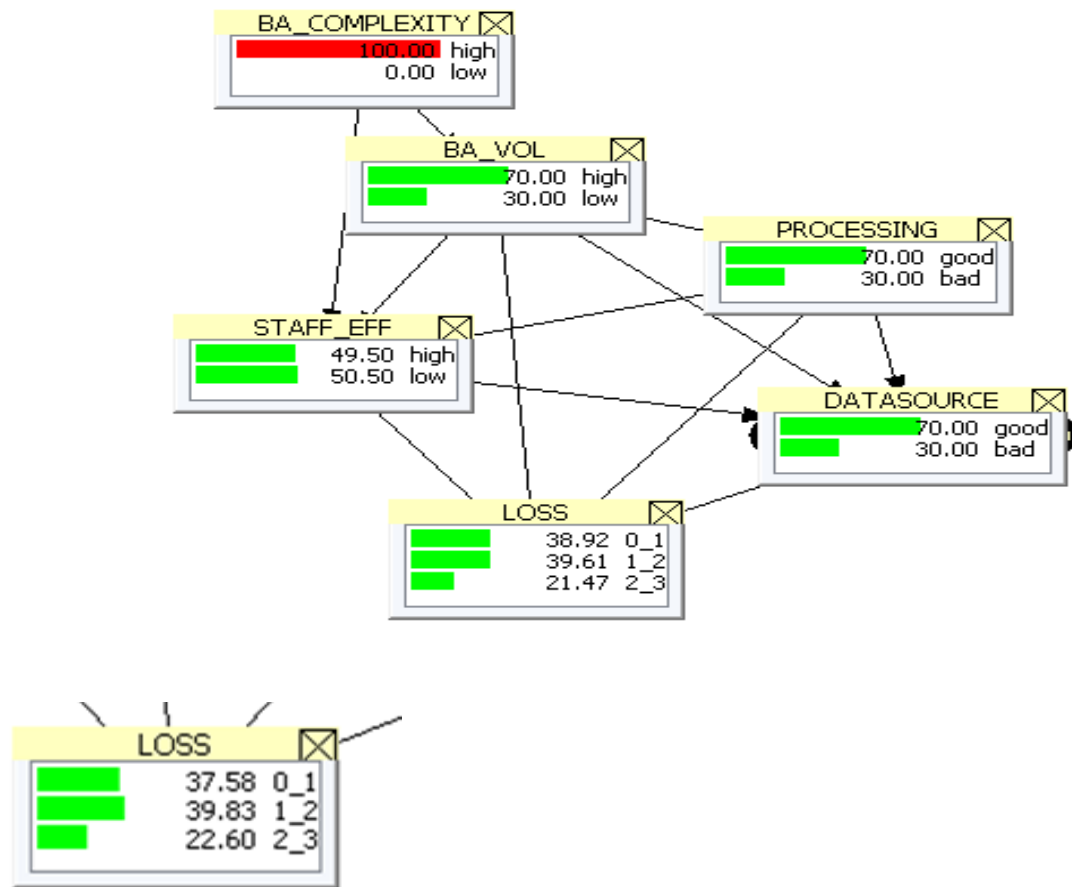
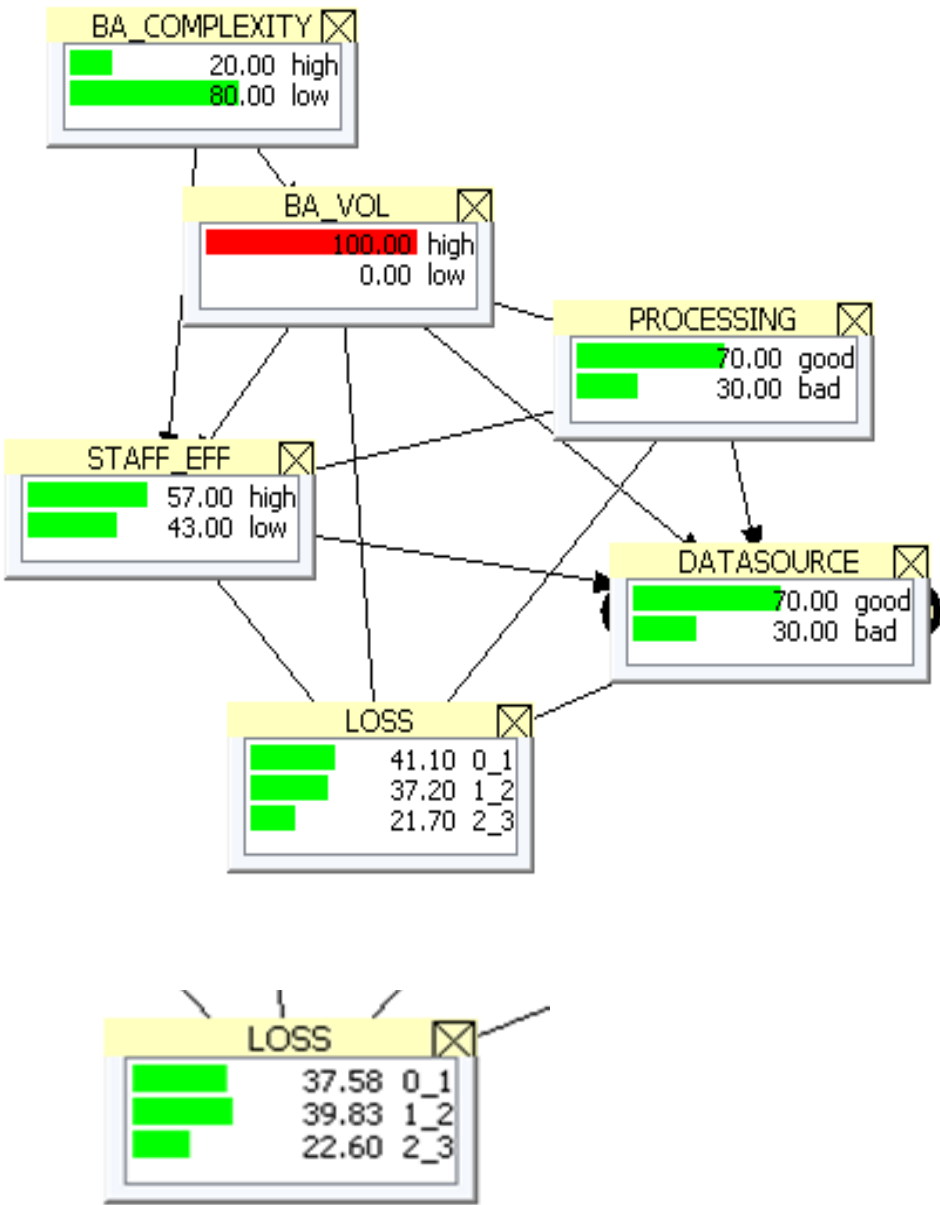
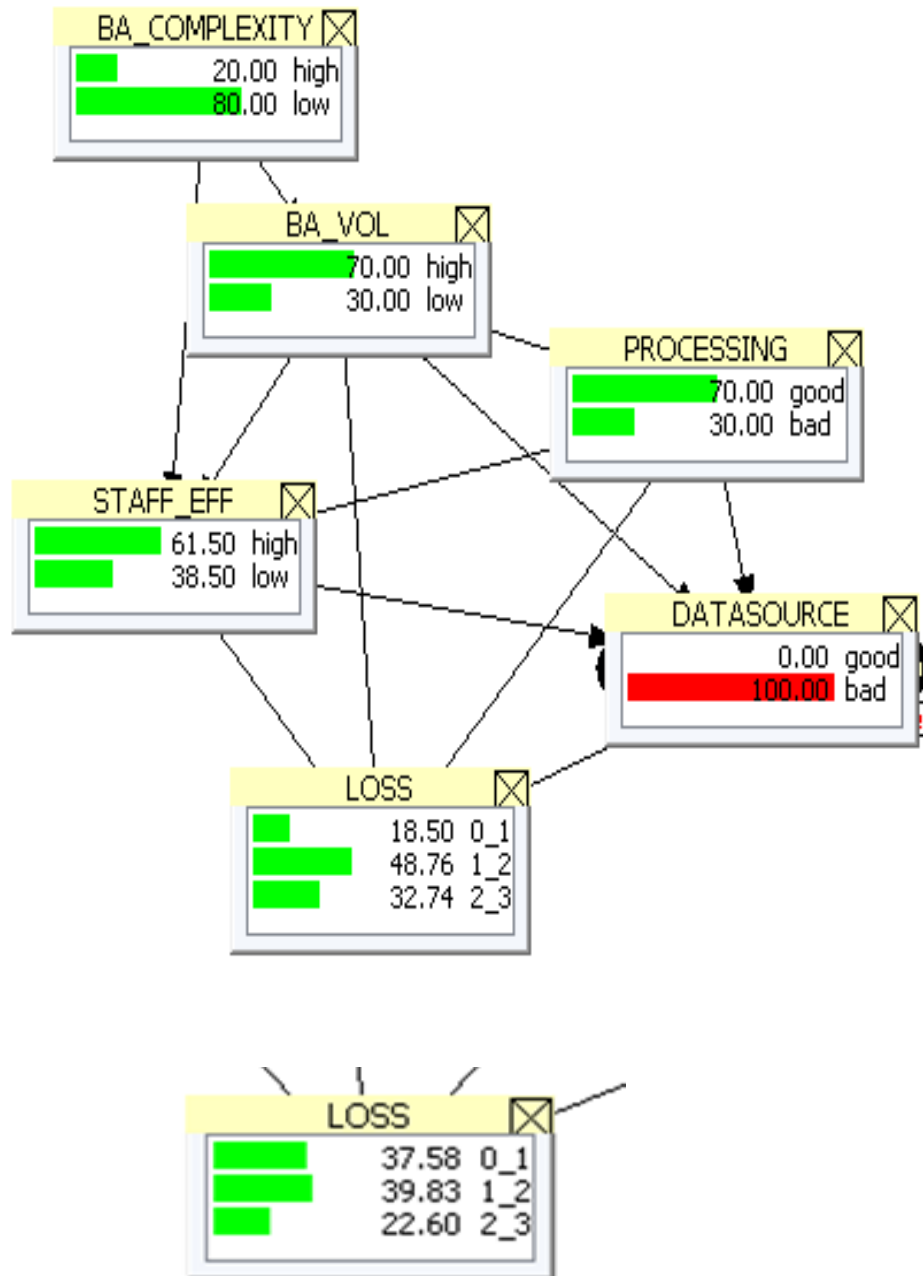


Figure 7 : Scenario Analysis- a

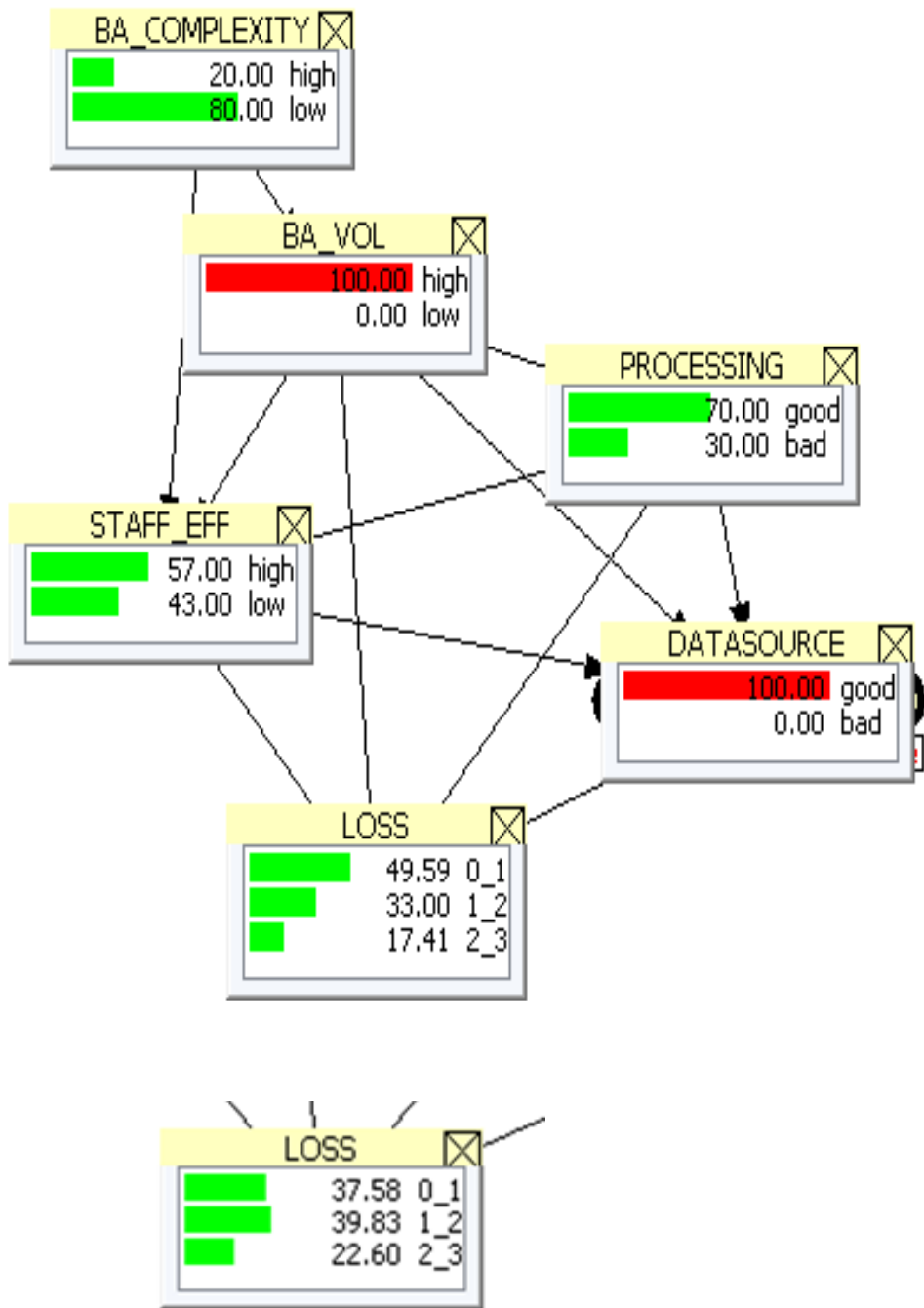


Scenario – b

# DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK



Scenario – c



Scenario – d

# DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

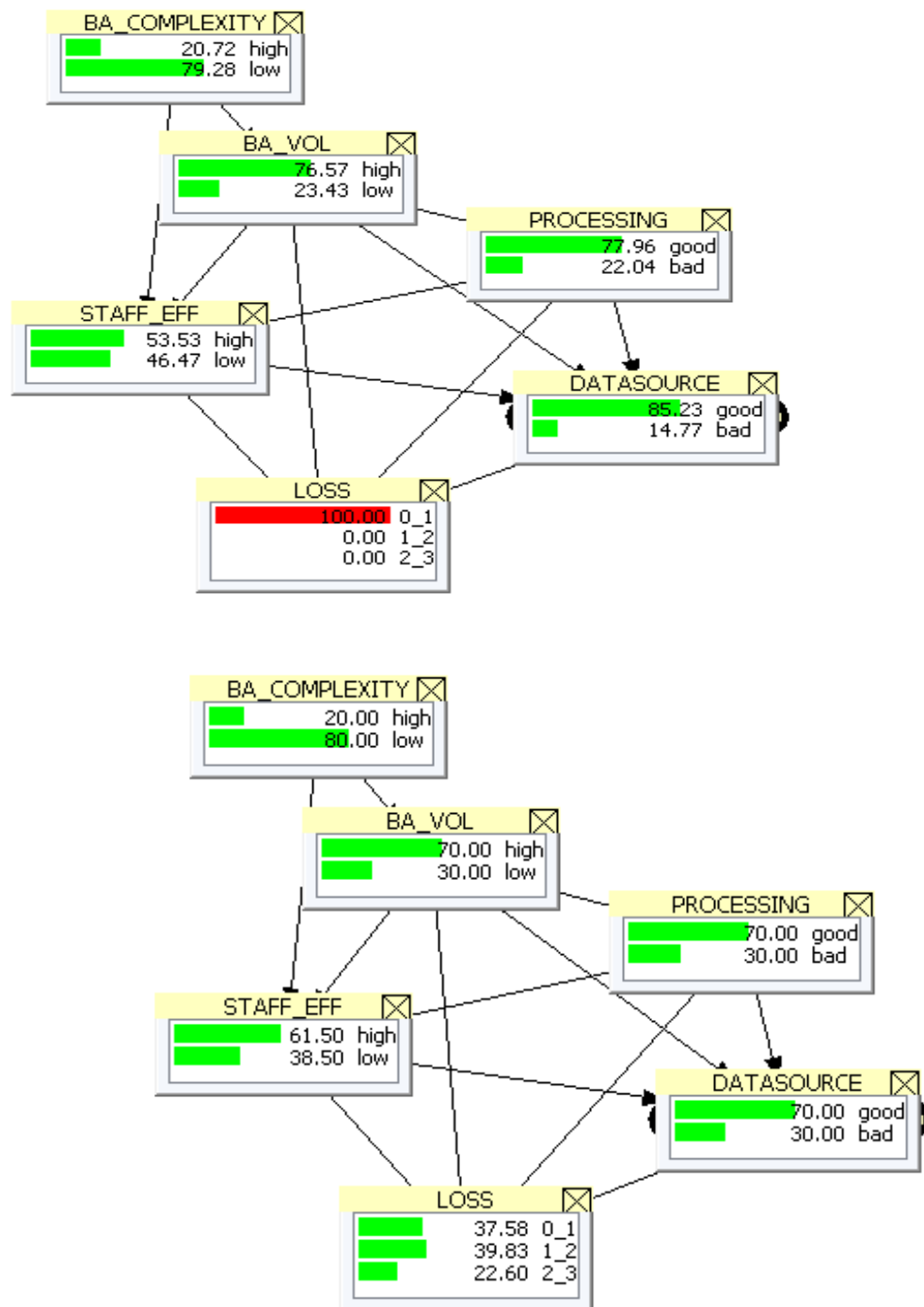
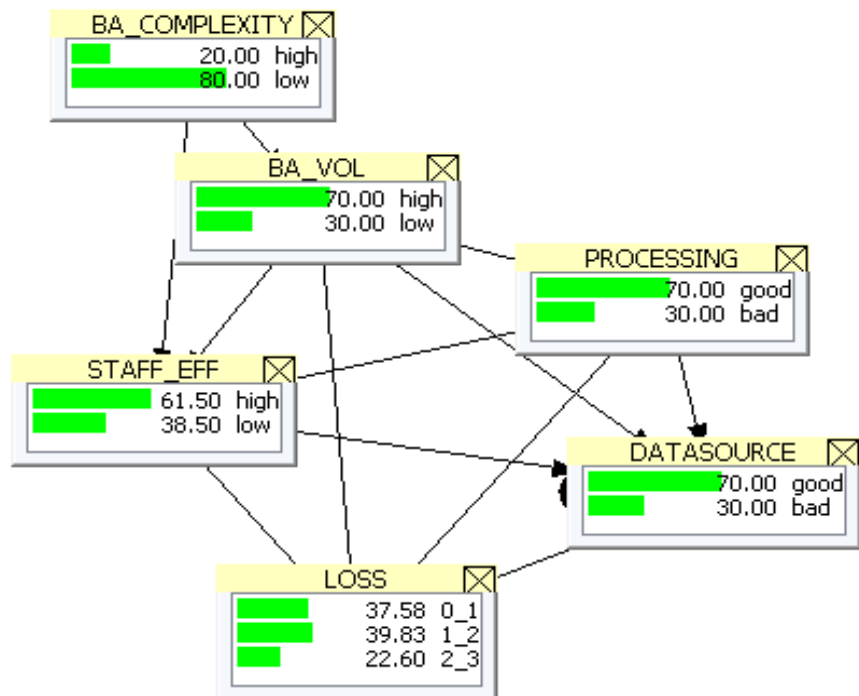
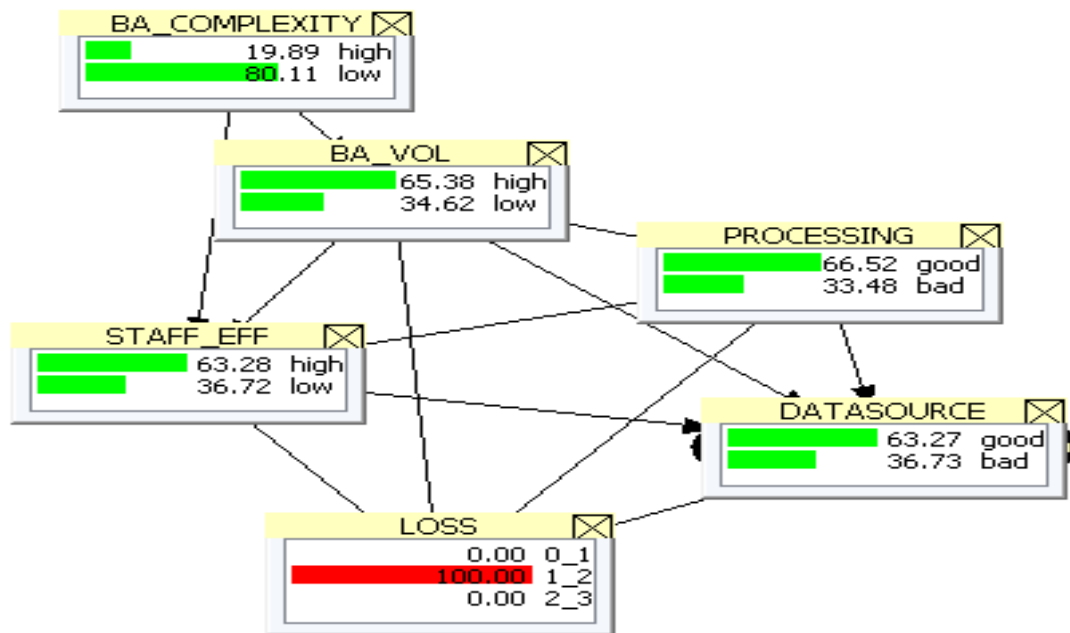
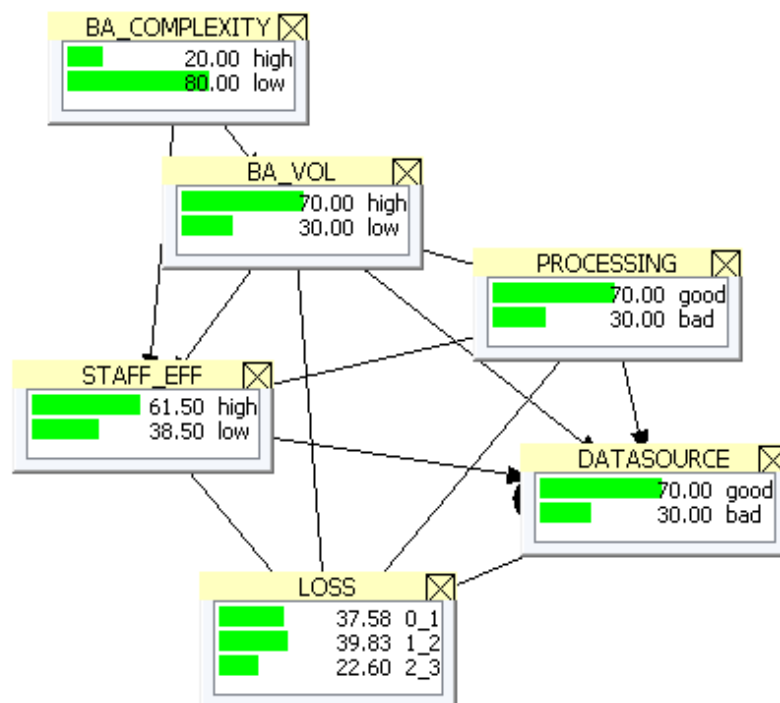
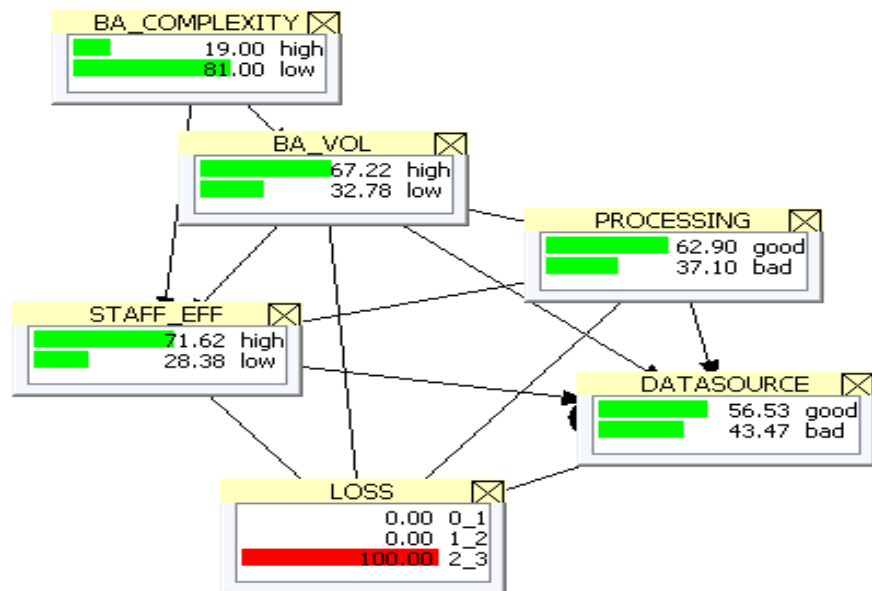


Figure 8 : Causal Analysis – a



Causal – b

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Causal – c

For the management of operational risks, a BBN may be augmented with decision nodes (e.g. restructuring, training etc) and utilities (e.g. costs, pay-offs etc) thereof.

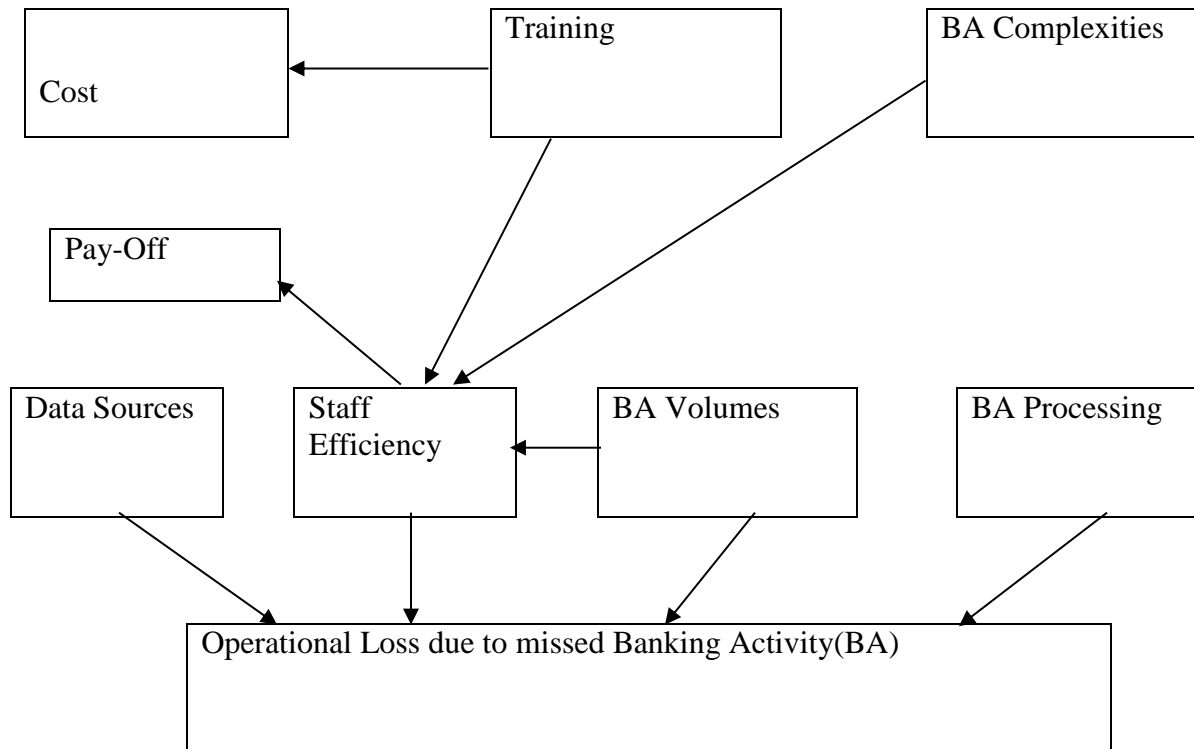


Figure 9 : Bayesian Network for a missed Banking Activity

## Conclusion and Future Scope

The Bayesian process of statistical estimation is one of continuously revising and refining the subjective beliefs about the state of the world as more data become available.

The continuing research plans a development plan which includes:

- Access to loss data central/banks are in possession of
- Advice/ deliberations from BIS/central/relevant bank authorities on construction of model (BBN) architecture through appropriate questionnaire and collection of relevant qualitative data.

This research predicts the following:

- Creation of a unified data base covering participating banks from India and other countries

## DEVELOPING A POSSIBLE OPERATIONAL RISK MEASURE FOR BANKING ACTIVITIES: AN APPLICATION OF BAYESIAN PROBABILISTIC NETWORK

- Conduct research on the same to profile the operational risk faced by the banking community.

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# ARE THERE LIMITS TO TRADITIONAL INVESTMENT ANALYSIS? – THE QUANTITATIVE – QUALITATIVE DEBATE

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**Abstract:** *This paper attempts to provide an answer to the Quantitative versus Qualitative investment methods debate. It starts with a discussion on each method individually and how each method perceives the opposing method. The Qualitative method sees the flaws in the Quantitative method and its inability to include in the analysis valuable qualitative information, in particular Human Capital (HC) practices, which can lead to misleading evaluations such as in the case of the Lehman bankruptcy in 2008. The Quantitative methods, however, are very powerful in their ability to retrieve and analyse data, especially in this era of – Big Data. Data is growing exponentially and only the use of technology and quantitative methods will be able to tap into this information. Yet, it includes only information that can be quantified and it neglects what cannot be quantified, such as HC practices. The paper suggests (1) new approaches to quantify HC and integrate it into the investment process; (2) a new quantitative which synergizes all investment methodologies; and (3) an integrated investment process which combines both Quantitative and Qualitative methods to achieve a holistic picture of equity investments and the estimation of asset values.*

**Keywords:** *Quantitative Methods, qualitative Methods, Human Capital Analysis, Quantifiable Data, Quantifiable Information, Investment Risk, Investment Edge*

*JEL Classifications: C00, G10, G11, G19*

## Introduction

Understanding the change management context for companies globally is the new challenge for managers and for investors. This is particularly important given the continuing risk of ‘hyper-reality’.

Hyper-reality occurs when representations of principal assets such as earnings, quantitative investment models, analyst’s estimates and debt proposals begin to reflect each other and the outcome does not necessarily represent what is actually occurring in the underlying assets.

Financial market players in global equity markets often forget there is a danger in disassociating the stock code from the underlying asset. Behind the pricing models is a real

company with real people and human capital and change management practices and systems. Pricing models which are used by investment market professionals do not typically include this complex interaction. So, investment decision outcomes are often incomplete.

In the context of the global financial crisis, traditional financial analysis models have been shown to be inaccurate. Investors need reliable lead indicators of the potential future value of their investments. While regulators debate how to regulate the financial industry, another important question emerges: is the information to assess corporate performance complete?

At the same time, much investment research is approaching commoditization, with investment managers and the buy and sell-side analysts working on similar data, using similar tools, provided by corporates at similar times.

And yet, there is pressure on investment managers and buy and sell- side analysts to understand “soft” variables in more depth: leadership, governance, management quality and remuneration and systems for managing change, in order to inform and add value to investment decisions.

When qualitative human capital data is used side by side with quantitative analysis, institutional investors have access to more valid and more powerful information on current and potential future financial performance.

“Quantitative Analysis” has a whole spectrum of methods and approaches: from the pure “black box” heavily relied on computer science and machine learning methods to quantitative models based on sound economic theory; from pure mathematical models to statistical models, and; from pure technical analysis to fundamental and economic analysis. Selecting the method depends on the analyst beliefs (and in many cases their knowledge base).

With the current advancements in technology, data feed sources and globalization the need for quantitative analysis to help parse the data in a meaningful way and extract the desired information for investing/trading decisions is increasingly growing. At the same time returns have diminished and Alpha generating strategies have been harder to find, which calls for the demand for innovative investment (and investment analysis) approaches.

Financial markets are too complex to be explained by one research/analysis methodology and all investment philosophies/methodologies have merit – each methodology dissect different aspect of the market and market behaviour and the integrated analysis brings together the full story of market behaviour.

Ben Graham the “father of Value Investing” and the mentor of Warren Buffet (the most famous value investor) – is also considered the first “QUANT Analyst”, even though it was before the era of computers and the internet. His insight on how to analyse numeric information, however, to evaluate and understand the “intrinsic value” of a company is key to the way we use financial statement information to analyse and model companies’ valuation. With today’s computer power quantitative analysts are able to use his methods on a large scale to create “fundamental factor models” for equity portfolio investments.

Charlie Munger, Warren Buffet long-life business partner commented on the best way to approach investing: “You must know the big ideas in the big disciplines and use them routinely – all of them, not just a few. Most people are trained in one model – economics, for example – and try to solve all problems in one way. You know the saying: *‘To the man with a hammer, the world looks like a nail.’ This is a dumb way of handling problems.*” This interdisciplinary approach can be taken a step further to infer that we should not only include different disciplines but also different quantitative methodologies; and not only numeric analysis but also text.

Quantitative analysis (by definition) relates to the way we use numeric information, which is considered “hard” information and in contrast to the Qualitative analysis, which is mostly based on text and is considered “soft” information. With the advances in computer science it is possible to analyse text – which is referred as “text analytics” and is mostly used to model and predict market sentiment. Text Analytics tries to capture the behaviour of participants in the market. It might not, however, be able to capture all the intricacies of human behaviour and quantitative methods need to be supplemented by fundamental and rigorous qualitative research which takes into account much more broad based change management themes, human capital and special events which factor in the reality of the ebb and flow experienced by firms in changing economic conditions.

### **Why Supplement Traditional Financial Quantitative Methods with Rigorous Qualitative Research?**

One feature of the current system is the “celebrity analyst” and “celebrity investment manager” who develops an individualized, non-documented approach to analysis. When either of them leaves a firm, their insights and methodologies go with them, creating more variation in the overall quality of analysis and investment outcomes (Royal and Althausen, 2003).

Purely financial information and traditional analytical tools have not served investors well. The game is changing from a reliance on traditional models, which focus on “lag” indicators of past financial performance, to a focus on more contemporary qualitative “lead” indicators. But, most traditional analytical approaches do not include systematic analyses of management quality.

In the US, more than half of the shares issued by listed companies are controlled by institutional investors, who are increasingly concerned about all of their investments, and need to see early warning signs of failure or growth prospects.

For commercial bankers, lending proposals are either accepted or rejected on the basis of set financial ratios, such as debt to equity and loan to valuation.

But, do these ratios tell the real story? In fact, is it dangerous for investors to rely on quantitative measures alone? Quantitative analysis, by itself, can underestimate the complexities involved in industry sectors. Properties shared by an industry sector may be superficial, obvious or unimportant.

A famous finance model, the Black-Sholes-Merton (BSM) model, was impressive in its mathematical elegance. Derived by Nobel Prize winning economists, it was used extensively by major financial institutions as they developed finance credit derivatives.

Long Term Capital Management (LTCM) used the BSM model because the partners strongly believed in the power of computing and mathematics to uncover global trading opportunities. For some years they produced extraordinary returns. But, LTCM collapsed when global markets panicked following the Russian financial crisis of 1998. The trading and pricing models had made markets highly interdependent, but the models themselves had not factored in the potential for crises in human behaviour under conditions of unpredictability.

In spite of LTCM’s massive losses, Merton defended the “quant” approach, saying that “A lot of the problems in structured finance have not been due to too much innovation, but a failure to innovate sufficiently”. We agree that there needs to be more innovation, starting with clearer

analysis of the human factor in the investment process, if these kinds of events are to be avoided. Some apparently sophisticated financial models, such as David Li's Gaussian Copula function, have created problems.

In statistics, a copula is used to couple the behaviour of two or more variables. Li's model used inadequate historical pricing data, in ways for which it was never intended, creating widespread mispriced assets with devastating consequences for investors and their clients. In creating his formula, Li oversimplified the complexities of issues such as real world default statistics. His model was built on the assumption that: "The only thing that matters is the final correlation number, one clean, simple, all-sufficient figure that sums up everything" (Salmon, 2009). But the model was incomplete, in spite of its seductive mathematics.

Nassim Nicholas Taleb (2007), hedge fund manager and author of *The Black Swan*, has criticized this specific model, and the assumptions which underlie similar analytical approaches. He notes: "People got very excited about the Gaussian Copula because of its mathematical elegance, but the thing never worked...Co-association between securities is not measurable using correlation." Historical data alone cannot prepare investors for that one day when everything works against them.

Peter Wilmott, a quantitative finance academic and consultant indicates that the relationship between two assets can never be captured by a single scalar quantity.

For instance, consider the share prices of two sneaker manufacturers. When the market for sneakers is growing, both companies do well and the correlation between them is high. But when one company gets a lot of celebrity endorsements and starts stealing market share from the other, the stock prices diverge and the correlation between them turns negative.

And when a nation morphs into a land of flip-flop wearing couch potatoes, both companies decline and the correlation becomes positive again. It's impossible to sum up such history in one correlation number" (Salmon, 2009).

Overly simplistic pricing and trading models fail to incorporate the complexities which underlie the listed firms which are the basis of these investments. It is not possible to sum up human capital dynamics within firms, or in the broader market, with one correlation number.

As David Li said of his Gaussian Cupola formula: *"The most dangerous part is when people believe everything coming out of it."*

But, in the finance industry, where "quant analysts" command enormous prestige, it is not surprising that some institutional investors see only the numbers, and become disconnected from the complex reality the figures are supposed to represent. "They think they can model just a few years' worth of data and come up with probabilities for things that may happen only once every 10,000 years. Then people invest on the basis of those probabilities, without stopping to wonder whether the numbers make any sense at all" (Salmon, 2009).

While this investment approach is less than ideal, it is not surprising. Over 90% of financial analysts studied in a case analysis of investment banking in Australia had degrees in quantitative disciplines, such as econometrics, actuarial studies, economics, engineering and accounting (Royal and Althausen, 2003).

But, even world renowned economists now believe that understanding the financial performance of firms requires a much deeper, more robust, understanding of human behaviour than economists previously admitted (Akerlof and Shiller, 2009). Firms like Google recognise this and use qualitative human capital indicators, as well as quantitative models, as a component of the business communication cycle.

Quantitative methods, developed by finance academics, need to be supplemented by fundamental and rigorous **qualitative** research which takes into account much more broad based **change management** themes, human capital and special events which factor in the reality of the ebb and flow experienced by firms in changing economic conditions.

#### *Definition of "Human Capital"*

In this context, we define human capital as the systems by which people are managed, and therefore, human capital becomes observable and comparable, across industry sectors and across time. The term 'human capital' is distinguishable from the more commonly used term 'social capital' which is defined by Dunphy, Benveniste, Griffiths and Sutton (2000:6) as human sustainability, which implies building human capability and skills for sustainable high level organisational performance, and for community and societal well-being. (Royal and O'Donnell's 2008) definition of human capital as management systems assumes that human capital is manifested in a firm's unique configuration of observable human capital systems such as: training and development, performance management, knowledge management, career planning and succession planning. Human capital is broader than employee engagement, and incorporates management systems (Royal and O'Donnell, 2008).

This definition, consistent with Werbach, (2009), Raisch et al (2009), Raisch and Birkinshaw (2008) assumes that human capital is manifested in a firm's unique configuration of human capital systems such as: training and development, performance management, knowledge management, career planning and succession planning. HR management systems are difficult to replicate, to implement and to change, and it is argued that firms which have superior HR management systems also have a potential long-term source of competitive advantage (Becker, Huselid and Ulrich, 2001. Bassi and McMurrer, 2007).

### *Human Capital Impacts Financial Performance*

Human capital does have an impact on future financial performance. Watson Wyatt compared 1999 HCI (Human Capital Index) scores and 2001 financial results and also 1999 financial results and 2001 HCI scores in an attempt to determine which direction the link between the two ran.

The result was a much larger positive correlation between 1999 HCI scores and 2001 financial results, indicating that it is more likely that superior HR practices will improve financial results than financial results will lead to improved HR practices.

Institutional investors look at intangible sources of value. Bassi et al (2001, 2007) surveyed 275 active US institutional investors on their basis for investment and found that 35% of decision making, in a sophisticated simulation, was based on non-financial data, of which half was specifically human capital related. They also found that 60% estimated that 20-50% of investment decisions are driven by non-financial data. So, while investors try to assess “quality of management”, they don’t have the tools by which to analyse non-financial value in a systematic way.

Some of the of the human capital analytical tools available in the past have focused on applying principles from accounting and finance to human resources. These have included attempts to value people as assets (by applying accounting valuation principles); creating an index of ‘good’ management practices and relating these to business results; statistics about the composition of the workforce and measures of the productivity and output of people (Mayo, 2001).

But none of these approaches analyse the fundamental **drivers** of human capital in ways which can be readily understood by investors. Investors need to be able to assess whether a firm can deliver on its stated strategy, and to understand whether management systems are internally consistent and consistent with strategy. “Long only” fund managers, in particular, say that their job is to back management teams, but they lack the necessary analytical tools assess management teams in a systematic way.

This is important in knowledge intensive firms where intangible value is a large proportion of firm value. Institutional investors need to be able to value intangibles like intellectual capital (which can be seen to some extent in patents and royalties) but also they need to be able to assess the quality of the underlying human capital and change management which drive the innovation which underpins the intellectual capital.

Many human capital models fall into the trap of measuring what they *can* measure rather than what they *should* measure. For instance, measuring knowledge in an organisation is more than numbers of hours in training sessions, or number of patents held. It is possible to create knowledge capital indices, but knowledge capital can only exist in the context of management systems. Initiatives like the United Nations Principles for Responsible Investment provide incentives to broaden equity research to incorporate themes from good governance principles and strong environmental management.

The “first wave” of ESG investment, prior to UNPRI, was launched by selected large European institutional investors in November of 2004. The aim of the Enhanced Analytical Initiative (EAI) was to encourage sell-side analysts to systematically examine intangibles by allocating five percent of their broker commissions for superior intangibles research (Bauer, Haerden et. al., 2004). This initiative, now a component of UNPRI, was an implicit acknowledgement of a knowledge gap in securities analysis to distinguish material non-financial

data. Social or “S” ESG themes are less standardized, and vary from themes as diverse as labour law compliance, health and injury statistics, community engagement (such as in the London Group Benchmarking Model), social business investment to philanthropy, and trade-offs between ecological and social themes (Angus-Leppan, Benn and Young, 2010).

UNPRI and ESG ensure that listed companies are increasingly judged on their quality of management, so human capital analysis is becoming increasingly more strategic to CEOs, Boards and institutional investors. However, institutional investors need to move through the previous generations of SRI investing to optimize the insights from a new and most powerful approach to SRI investing, which incorporates human capital analysis. In this way, institutional investors are more likely to be able to analyse and interpret elements of human capital risk, which is a significant issue discussed later in this paper by way of a company example. But, so far, these initiatives have fallen short on focusing on the underlying human capital drivers of value.

*The importance of Qualitative Processes - Human Capital Systems and Risk at Lehman Brothers 2008*

To illustrate the challenge that institutional investors face with regards to formally and systematically predicting the future performance of a firm and indeed events that lead to financial failure, it is worth noting that the same day that Lehman Brothers investment bank filed for bankruptcy on September 15, 2008, in New York, the three top credit ratings agencies had rated the firm as above average in its ability to meet its financial commitments. Not all quantified quantities can be identified through a mathematical process as highlighted in the discussion above with regards to quantitative strategies and the investment process. Furthermore, a superficial analysis of selected “S” indicators from an ESG perspective would indicate that the bank was doing well financially. For instance, at the 2008 ALB China Law Awards, Lehman Brothers was crowned Debt Market Deal of the Year and Equity Market Deal of the Year. In 2006, Dick Fuld, the CEO, was named #1 CEO in the Brokers & Asset Managers category, by *Institutional Investor* magazine. In 2007, Dick Fuld received a \$22 million bonus. In 2007, Lehman's net profit had risen 5 percent to a record \$4.2 billion. In June 2008, rival CEOs, including Lazard's Bruce Wasserstein, stated their confidence in Fuld as CEO.

While this qualitative “S” information is necessary, it is not complete, as became evident later that year. “The day that Lehman filed for bankruptcy, September 15, 2008: S&P rated the investment bank's debt as A – a ‘strong’ capacity to meet financial commitments, (Swedberg, 2009). Moody's had rated Lehman A2 -‘low credit risk’. Fitch rated Lehman A+ or ‘high credit quality’ ” (Evans and Salas 2009). Those analysts who had tried highlight the negative aspects of the corporate culture, including the performance management and remuneration systems, were criticised (Swedberg, 2009).

With the benefit of hindsight and documents which became publicly available after the Lehman bankruptcy, US House committee Chairman Henry Waxman said Lehman documents portray a company in which there was “no accountability for failure“. CEO Dick Fuld ran Lehman in an authoritarian manner, creating the competitive corporate culture characteristic of investment banks. Anyone who was perceived as a threat by Fuld was eliminated, and so were critics who argued that Lehman was “heading for trouble” (McDonald 2009). Fuld's personal experience was as a bond trader , he had little detailed experience of financial instruments such

as collateralized debt obligations and credit default swaps (McDonald and Robinson 2009:91, 234-36). Lehman's last CFO was a lawyer, without qualifications in Finance or Accounting. Hedge Fund Greenlight Capital's president, Timothy Einhorn, highlighted some of these human capital themes in October 2007, March 2008 and May 2008, but was criticized by journalists in the business press for being inexperienced, arguing his analysis was "underdone". Whistleblower Matthew Lee, a former senior vice president, Finance Division, in charge of global balance sheet and legal entity accounting, was sacked in late June 2008. In May 2008, Lee had written a detailed letter to Lehman's top managers about \$50 billion Repo 105 transactions in Q2, 2008 (Wall Street Journal, 2010). *The Street* website stated that Dick Fuld "ruled with an iron fist, and ultimately his poor leadership and management led to one of the largest bankruptcy filings in history, noting that "A single man's leadership style resulted in the financial ruin of tens of thousands of employees and shareholders." Lehman's bankruptcy was many times the size of Enron.

This indicates that institutional investors may not have learned enough about the strategic role of human capital analysis as a lead indicator of future financial performance since Enron declared bankruptcy a decade ago and human capital was not a theme in ESG reports and/or other investment reports over the period or a part of any quant strategy with regards to investment. Waddock (2002) noted that Enron won a spot for three years on the list of the best companies to work for in America. In 2000, it received six environmental awards. It issued a triple bottom-line report. It had policies on climate change, human rights and anti-corruption. The CEO was a guest speaker at ethics conferences. Most importantly, however, is that Enron featured in many social investment funds before it collapsed. However, a human capital perspective on Enron could have revealed a culture of human capital systems, including performance management systems, remuneration and career planning, which were internally inconsistent and inconsistent with the strategy of the organisation. A human capital analysis of these systemic inconsistencies can highlight questions of sustainability, in its broadest sense, that is, "Can this organisation survive?"

By examining any inconsistencies between human capital systems, such as remuneration and performance management systems, a human capital analysis can raise questions about the sustainability and internal consistency of such practices. In the case of Lehman Brothers, the inconsistencies between rewards, remuneration and performance management systems and have been implicated in the downfall of the firm. Quant Strategies and Quant Funds either ignored the human capital qualitative data or grappled with it in a superficial way and the common "S" themes in ESG investing overlooked the complexities and investment risks at Lehman's. It is Qualitative human capital insights that need to be systematically embedded in the investment analysis and recommendations of institutional investors. Without a full analysis of human capital data in the investment process sitting alongside fundamental and/or quant strategies risk let alone decisions about the future financial performance of an investment can be poorly analysed, leading to devastating consequences.

## What do Quantitative Fund/ Quantitative Investment Strategy mean?

To someone who is not familiar with the jargon of the financial industry “quant fund” or “quant strategy” means any study or strategy that is based in quantitative data. This fits the general explanation of “quantitative analysis” explained by “Investopedia” – *“In broad terms, quantitative analysis is simply a way of measuring things. Examples of quantitative analysis include everything from simple financial ratios such as earning per share to something as complicated as discounted cash flow or option pricing”*. In this context it would include Chartists (“technical” analysis), Macro analysis and also “Value Investing” funds, who in general do not consider themselves as “quants” but rather the non-quant alternative to investing.

For a financial professional, however, these definitions are much narrower and encompass only the most sophisticated, technically advanced funds. Their investing models are computer-based, data-intensive using mathematical and statistical methods. In a pure “quant shop” the investment decisions are determined by the (computerized) models rather than by human judgment. There is, however, a middle ground where the fund manager will use human judgment in addition to the quantitative model.

In the space of Equity Investment Management, Fabozzi, Focardi and Jonas (2008) make a distinction which is consistent with the conventional “quant” definition in the financial industry. They make a distinction between “fundamental” (or “traditional”) investment process and “quantitative” investment process. “Fundamental” is an investment process performed by a human asset manager using information and judgment; “Quantitative” is an investment process where the value-added decisions are primarily based on quantitative outputs generated by computer-driven models following fixed rules. The term “fundamental” might be confusing – (1) not all human investment processes are based on fundamentals (e.g., technical analysis based on charts and price movement); (2) the majority of quantitative models are tilted towards fundamental factors. The best distinction might be – “judgmental” versus “automated”, however, “fundamental” and “quantitative” are the commonly used terms in the industry.

Is the Quantitative process fully automated? The answer would probably depend on the investment horizon. Algorithmic Trading is most likely fully automated and in particular “high frequency trading” and “electronic market making”. The shorter is the holding period (down to the millisecond in high-frequency trading) the more likely the process to be fully automated. No human judgment can intervene when the transaction is every minute or second or millisecond. An automated process driven by computerized algorithms is better suited for this type of transactions. The only human judgment in this case would be – (1) when programming the algorithm and testing its validity, and; (2) when deciding to execute the algorithm. This may not be the case for quantitative investment management. A model driven investment management process consists of: (1) the input system; (2) the forecasting engine, and; (3) the portfolio construction engine. Human judgment can be applied in any or all of these parts. In most cases the process is model-driven with minimal oversight which serves as a control function (i.e., “sanity check” – do the numbers make sense?) When it comes to latest news and rumours about a company, some may use discretion and oversight and some may use news scanning and flagging via propriety software.

### *Fundamental versus Quantitative Process*

The fundamental approach is likely to produce more alpha but brings more volatility. Reducing volatility is when the discipline of quant process comes in. The Quantitative process might bring tighter risk control and better overall performance. A study by Casey, Quirk and Associates (2005) tracked the performance of quantitative funds in the US large-capitalization sector, with a universe of 32 quant managers and 70 products and total assets of \$157 billion and 387 “other managers” (i.e., non-quant, most likely fundamental managers) managing 688 products with total assets of \$925 billion. The study found that for the 2002-2004 period quantitative-driven processes did indeed deliver better performance with tighter risk control. There was clear evidence that quant managers outperformed fundamental managers when the type of returns was taken into account. The most compelling finding was that quant managers outperformed fundamental managers with half the risk – quant managers as a group are better at quantifying the all-around risks and what is likely to go wrong.

Other evidence that relates to quant versus fundamental managers (during the period before the financial crisis), discussed in Fabozzi et. al. (2008):

- In general quantitative processes give an edge whenever a complex problem needs to be solved. Quant has an advantage when there is an element of financial engineering. The investment process is the same, but quant adds value when it comes to pricing components and coming up with products such as 130-30.
- Quantitative processes are more profitable than those run fundamentally.
- If one is a small player, it is probably better to be fundamental, but with a quant process, above a certain size, there are huge scale benefits. If a firm is large enough, the quant process is vastly more profitable. This profitability comes from: (1) a quant process can be scaled to different universes all run by the same team; and (2) a quant process allows more strategies about when and how to trade.
- Quants are ahead in terms of transaction cost analysis and market impact. This is a significant advantage. Quantitative firms evaluate the opportunity of a trade versus the projected minimal cost of the transaction, and make the trade only if profit exceeds costs.
- In general, because quant funds are broadly diversified, returns are watered down. Thus, quant fund do not hit the ball out of the park but they deliver stable performance.
- Quantitative firms have a problem in differentiating different financial product – how would they perform in the market when performance includes risk. To “market” this fund on this basis requires: (1) that the investment process and the underlying assumptions be disclosed; (2) that the investor have the ability to understand how a quantitative product will behave. The latter point is the most crucial one. Quantitative products are much more complex and more difficult to explain. This has been the main reason why institutional investors (i.e., pension funds, endowments) shy away from quantitative funds. It is more difficult for quantitative products to pass the hurdle of approval by the board of most institutional investor funds.

### *How Did Quants Do During The Financial Crisis?*

Fabozzi, Focardi and Jonas (2008) discuss the market turmoil of summer of 2007 and the significant losses that quant funds incurred during this period. The main problem was that quants had a lot of positions that were in common with people who had to liquidate positions in summer of 2007. A lot of leveraged managers needed to unwind things for which there was no market, to answer margin calls as banks got scared due to the subprime crisis. Quant managers all had similar positions, although they were massively diversified. The problem was one of statistical arbitrage strategies; there was too much money in short positions in a specific period of time. Hence, the similarity in strategies and in factors led to liquidity problems and was detrimental to most quant funds, and as a consequence was also detrimental to the market as a whole.

Another problem was the heavy shift in correlation at that period, which most certainly impacted the quantitative process. The increase in correlation meant a reduction of diversification and poor performance in hedging strategies. Khandani and Lo (2007) concluded that increase in correlation over the 1998-2007 period made markets more global and more prone to contagion. The difference between the Long-Term-Capital-Management problem of 1998 and the financial crisis of 2007 is that the problem of 1998 was contained in a few firms where as in 2007 the credit problem spread to the equity markets. The problem with the financial crisis of 2007-2009 is that it hit all markets – not only all asset classes but also all markets globally.

During the financial crisis and a short period right after, quant funds endured very bad publicity and investors shied away from them. But since the recovery of the market (which is going strong for more than five years), quant funds not only managed to recover but also to increase their assets under management significantly – from about \$88 billion in 2003 to \$400 billion in June of 2014. There are increasingly more quant funds than in 2003 – the growth in number of quant funds is mainly in algorithmic funds, a block-box model with very short-lived discoveries, down to the millisecond.

Using the same distinction as Fabozzi, Focardi and Jonas (2008) between quant and fundamental funds, Chinacrini (2010) shows a different perspective on how quant funds performed during the financial crisis. He defined fundamental funds as “qualitative” funds – any funds that use a discretionary process rather than a systematic one was classified as “qualitative” fund. Looking closely at the classification in Chinacrini (2010), however, it is similar to the definition of the “fundamental” fund defined by Fabozzi et. al (2008). With 20 years’ worth of data (January 1994 to March 2009) he concluded that overall quant funds as a group perform better than “qualitative” funds, especially when considering all risk factors. This conclusion remained true even when he partitioned his sample to examine how quant funds performed specifically during the period of the financial crisis.

*What Can a Quantitative Process Quantify?*

Everything related to accounting at the company level, balance sheet and income statement, and even accounting at the national level, by nature is quantitative. Thus, in a narrow sense finance has always been quantitative. The novelty is that we are now quantifying things that are not directly observable, such as risk or things that are not quantitative per se, such as market sentiment.

A quantitative process is an empirical process. What is being quantified, however, is not necessarily directly observed. Quantifying, therefore, is more than a question of establishing a process of measurement. It is the definition of a theoretical term that can be put into relationship with other observations. The interest in quantifying things is not because we are looking for a “precise” number to an event but rather because these “estimated” quantities will allow us to predict (to a certain degree) other observations. Modellers in finance quantify quantities and vaguely defined concepts for the purpose of making a forecast. They are using these quantities – whether observed or not – as they believe that with these quantities (which are not “precise”) they can construct a useful forecasting model.

To estimate “hidden” quantities – quantities that cannot be observed but rather inferred by the model – Financial Modellers use a procedure known as Financial Econometrics. For example, volatility is a hidden term. Econometric models such as, Autoregressive Conditional Heteroscedastic (ARCH) or the Generalized Autoregressive Conditional Heteroscedastic (GARCH) or Stochastic Volatility models, all are ways to model the hidden (but very important for financial markets) volatility term.

Not all quantified quantities can be identified through a mathematical process. Market sentiment, for example, is such a quantity. One simple way, for example, to do that is to take analysts’ recommendations – a judgmental information – and convert it to quantitative information such as percentage of analysts issuing a sell versus a buy recommendation. A more sophisticated way, for example, is to model the signals of fundamental analysts – correlated versus uncorrelated.

Another example is the discipline of behavioural finance, which is based on the ability to construct working theories and/or models from data that express human behaviour and its associated biases. In this discipline one needs to measure the psychological state that leads to cognitive biases, such as overconfidence and belief persistence. A simple approach would be, for example, to use technical indicators such as momentum and reversals. A more sophisticated approach, for example, would be to model corporate behaviour in relation to the companies’ financial statements. With the advances in computer science, it is possible today to use text analysis – a quant manager can develop behavioural strategies based on news and social media analytics.

With more participants in the market, it is not enough anymore to base your analysis and models on the databases that everyone else uses. To create an analytical edge you need an information edge. In this regards simply using financial statements (e.g., balance sheet, income statement, etc.) will not suffice. In order to achieve your information edge you need to dig into the footnotes, find discrepancies in the statements, interpret the information to an event such as – is there prospects of a merger? Is the company in a financial difficulty that is not evident from its financial statement? etc.

If everyone is using the same database and the same models then that could be very toxic to markets. The market events of July-August 2007 made it clear that many quant firms were using the same factors or predictors. This state of affairs is hardly surprising in light of the fact that factor models are one of the most intensively researched subjects in financial modelling and their use is widespread. Since linear factors are relatively easily determined, the same factors will tend to be used by a lot of quant managers to estimate profits. Therefore, unexploited profit opportunities would probably be found in the nonlinearities of the market. Nonlinear models are more difficult to model and that's the challenge.

### **How can Fund Managers – Fundamental and Quant – Have Better Control on Investment Risk and Gain an Edge?**

There are two main practices to approach this question: (1) using the same data but in a different way: using it differently either by different models or different methods (i.e., techniques) or different methodology; (2) trying to tap into new sources of data.

#### *Using the Same Data But in a Different Way*

The emphasis could be on building “better” models, in an attempt that the new models will be able to extract information from the data in a different way. It could be that the model will be able to capture the nonlinearities of the data, or will be able to model the distribution of returns in a more “accurate” way. Many of the fundamental theories in finance (e.g., CAPM, Black-Scholes, Sharpe Ratio, etc.) relay on assumptions that do not necessarily represent the “true” distributions and events which they try to model – using inaccurate model leads to inaccurate predictions and therefore poor performance. New models have been suggested – more sophisticated, more complex. Complexity of a model, however, makes it quite difficult to implement and adjust its performance attributions when necessary. Financial markets are complex and the simple models may explain the market conceptually but will not be able to capture all the intricacies of the markets.

One can also use more machine based – machine learning and other artificial intelligence techniques. The idea is to discover patterns in the data that can then be used for predictions. The crucial aspect of these techniques in finding an algorithm is – to separate information from noise. The general methodology for performing this separation is to constrain the complexity of the algorithm so that it captures the important features, not the noise. The concept of Information Theory may be used to assess the amount of information that can be extracted from the data. Unfortunately, methodologies to separate noise work well only if there is not much noise and if the sample is very large. In most financial applications, however, neither condition hold. Data mining applications to finance need support of theory to guide the search. For most financial markets/instruments that does not exist with the exception of derivatives.

The above two approaches even though take a different direction in modelling and analysing the data, they suffer from acute drawbacks. In the context of “using the same data”, we suggest, a third approach – synergizing all investment methodologies.

Investment managers are classified by the methodology they use for investment decisions and their funds are also classified by these methodologies. The main classification groups are: fundamental, economic/macroeconomic, technical and quant. Fundamental (mostly “Value Investing”) primarily focuses on a list of “best ideas”; Economic (i.e., Macroeconomic analysis) focuses on cyclicalities in the economy and markets; Market (i.e., Technical analysis) focuses on charting the movement of prices and predicting the future trend; Quantitative, usually associated with a “crunching numbers black box”, its usability and effectiveness, however, is much wider and comprehensive.

Each and every one of these methodologies has merit and each uses the data in a different way and therefore may extract and focus on different aspects of the markets. Financial markets, however, are very complex, and unlike velocity or temperature or DNA do not have a repeatable, replicable pattern that can be measured and predicted with almost certainty. Financial markets can be unexpected, unpredictable and changing constantly, because unlike hard science the human element is rooted in their behaviour; and human behaviour can be bewildering at times.

There is no right way or wrong way to look at the market and no “exact” or “correct” process exists. Each methodology dissects different aspects of the market and market behaviour and the integrated analysis brings together the full story of market behaviour. By combining market, economic and fundamental data and using quantitative techniques this new methodology can be applied to the benefit of investors, traders or policy makers in their decision-making process – be it an investment strategy; a trading strategy, or; market policy.

The importance of such a methodology could be illustrated as follows. Suppose for example that the market is exhibiting a spike in volatility. In order to decide if and how to make adjustments to the portfolio, a portfolio manager needs to understand the source of this risk and whether it is fundamental or technical. If the source was an economic event then the question becomes whether it’s a temporary panic in the market on a situation that is about to be resolved (as was the case in early 2010 when concerns about the European debt intensified, the market volatility spiked and then recovered as the Euro zone started offering solutions for the problem.) It also helps to understand whether the portfolio has a temporary exposure to excessive risk that may need to be mitigated. If it is a fundamental shift in the economy (known in econometrics as a regime shift) then models need to be adjusted and risk and portfolio construction need to be reassessed<sup>1</sup>.

### *Trying to Tap into New Sources of Data*

We could increase the certainty of our predictions by tapping into new data which may add information that we did not have before. We are living in an era of great technology and globalization, where new information comes to our attention every second of the day. This is the age of – Big Data.

The problem with most of the data, even though available, is that most of it is Unstructured Data which is typically text heavy. Traditional computer programming is not able to analyse this type of data, for this task you need specialists in Information System and in particular in Unstructured Information Management Architecture (UIMA). Yet, some text data cannot be

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<sup>1</sup> A system which integrates all methodologies and the data sources associated with them will be able to assess the “exact” causes for a change in the market in an efficient and timely manner. The more efficient is the analysis of the risk the better is the portfolio manager ability to effectively mitigate it.

extracted and analysed via this new technology and therefore left unused. Especially in a quantitative process, only data that can be “quantified” is used. Fundamental process may use text data and extract data manually, but will not necessarily try to tap into new data, mainly because of cost or lack of awareness. The information/data that is “left” unused, however, could be very valuable and should not be ignored. One such “ignored” but valuable information is – Information on Human Capital (HC).

### *The Role of Human Capital*

There is quite a significant literature on the relationship of investment in HC and firm’s performance. For example, Bassi, Lev, Low, McMurrer and Sierfend (2001) and Pfau and Kay (2002) found that organizations with best HC practices provide higher returns to shareholders than companies with weak HC practices; Low and Kalafut (2002) and Hansson, Bo, Ulf Johanson, and Karl-Heinz Leitner. (2003) show the impact of investments in HC on firm’s future financial performance, and; Buckingham and Coffman (1999) find that quality of management was key factor in determining employee retention, customer satisfaction and productivity.

The event of Lehman Brothers in 2008 as described in a previous section above can serve as a good example to the findings of Buckingham and Coffman (1999) and highlights its importance. As discussed in Royal and O’Donnell (2010), it is clear today that the piece that was missing from the analysis and evaluation of Lehman Brothers before its bankruptcy was the information on HC and in particular, as it relates to its management, CEO Dick Fuld, who managed Lehman in a totalitarian manner, where anyone who critiqued him or was perceived as a threat was eliminated. This type of management evidently does not create a corporate environment and culture of engagement and productivity.

Buckingham (2005) explains how good managers create good systems of HC – from hiring the right people to building the right working environment which leads to performance and productivity. In other words, good management establishes good HC practices<sup>2</sup> in the company. This implies that the key element is – management.

This observation is not surprising. Two well-known value investors, which are also considered among the best investors of all times – Warren Buffett and Carl Icahn – focus on management. Buffett invests in a company with good management. In his 2007 letter to shareholders, he states: “*Charlie [Munger] and I look for companies that have a) a business we understand; b) favourable long-term economics; c) able and trustworthy management; and d) a sensible price tag.*” Carl Icahn, on the other hand, takes the contrarian approach. He looks for companies with poor management. After he purchases a significant position in the company he calls for change of management or the divestiture of assets in order to deliver more value to shareholders<sup>3</sup>. Carl Icahn was once quoted: “*One of the hidden ‘assets’ in many companies is top management: get rid of them and the value goes up. What’s going on in companies these days is absurd. It’s like a corporate welfare state. We’re supporting managements who produce nothing.*”

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<sup>2</sup> Bassi and McMurrer (2007) and Royal and O’Donnell (2010) introduce management practices as a key driver among the HC drivers.

<sup>3</sup> The compensation of CEOs is a subject on which Icahn focuses publicly, as he believes that many are grossly overpaid and that their pay has little correlation to stock performance.

*No, it's really worse than that. Not only are we paying these drones not to produce, but we're paying them to muck up the works."*

If these great investors, with outstanding investment records focus on company's management as a driver of firm's value, then they must be doing something right. The management factor or any driver that relates to HC practices has been estimated qualitatively, yet it has not been integrated in any quantitative model, because this information is both difficult to attain<sup>4</sup> and to quantify.

The aspect of investment in HC is not addressed by any investment process, except for the purposes of measuring and ranking ESG Index. Part of the "S" in ESG relates to investment in HC, but there is no explicit information available on HC ranking or its contribution to the overall ESG ranking of a company. Furthermore, De and Clayman (2010), when estimating the relationship of each component in the ESG (i.e., "E", "S" and "G") separately with returns, concludes that unlike the "G", the "S" does not have an impact on subsequent returns<sup>5</sup>. This is not surprising, because the "S" as it is measured today is quite problematic: (1) It tries to encompass everything that relates to the social activity of the company not only HC. It also includes Human rights policy, community policy, product responsibility and health and safety policy. Hence, unlike the "G", which focuses mainly on issues related to the Board of directors, the "S" is a much "noisier" measure. It could be that De and Clayman (2010) results are driven by this "noise" (some of the social issues might be relevant to value and some are not, and the overall aggregate of them shows no relationship to future returns.) (2) Unlike the measures of the governance score which are more identifiable and publicly available (as this information is regulated), the "S" is much more difficult to identify and/or attain. Therefore the proxies may not be measuring what they are trying to capture, which leads to a "bias" of omitted variable. The "bias" is created when the model compensates for the missing factor by over- or underestimating the effect of one of the other factors.

From the above discussion it is clear that there is much work to be done on quantifying HC drivers both in terms of investment models and ESG measures. Therefore, one begs the question – what can be done differently?

In the space of Indexing and Ranking, we can suggest a stand-alone HC Index/Ranking. There is not much empirical evidence to show how and if human right policy or community policy relates to firm's value<sup>6</sup>. We do have, however, both from qualitative and quantitative studies evidence that good HC practices lead to increasingly better future financial performance and an increase in a firm's value. Thus, most likely such an Index/Ranking would be of interest to the investment community. It is also very likely that if we separate investment in HC and rank

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4 Bassi, Harrison, Ludwig and McMurrer (2004), explains that most quantitative research on firm level HC practices has been with data from European countries, where researchers have access to better data on firms' investments in HC. These data however, have been unavailable for most researchers in the US. This problem is also present when it comes to information on sustainability – European companies are required to provide a sustainability report to the exchanges, something that is not yet required in the US.

5 De and Clayman (2010), do find, however, that Social scores leads to higher subsequent ROE. The measure that is more relevant to valuation is in fact – ROCE. But this relationship of ROCE and social scores has not been investigated yet.

6 This might be a relevant topic for future research.

it separately – then there might be a positive correlation between investment in HC Ranking and the overall ESG Ranking of an organization<sup>7</sup>.

To create the HC Index/Ranking we can use all the information already gathered in relation to HC which is embedded in the “S”. In addition, since Royal and O’Donnell (2010) include in their HC matrix, among other indicators, also remuneration and compensation<sup>8</sup>, we should take these information from the “G” (which in addition to information on Board of director policies also include information on compensation). Putting these two pieces of information together might present a better quantitative measure (or proxy) for HC practices. Taking it a step further, it could be that we should also consider reconstructing the “G” as well, to only include information related to Board of director policies and issues. This is probably a more “accurate” measure of governance, which is more in line with the definition of corporate governance<sup>9</sup>.

Creating a HC index/Rating is one step in attempting to quantify HC, but it is certainly not enough. We should also consider how to quantify HC practices and integrate them in a quantitative investment model. As discussed above, the key factor is management, and good management will establish good HC practices. Therefore we can think of it as a primary and a secondary effect. The primary effect is good management; and the secondary effect is good HC practices (i.e., if we find good HC practices it will imply good management). We can now try to measure either the primary effect or the secondary effect. But, which measure/effect should we focus on? This will depend on data availability and the ability to quantify it.

Measuring the primary effect means focusing on trying to find proxies for quality of management. The available and quantifiable information on management has to do with their compensation and compensation policies. We can create a proxy using this information in relative terms, for example: (1) management compensation and compensation policies relative to the compensation and compensation policies of the company as a whole; (2) firm’s management compensation relative to its industry peers compensation, and; (3) firm’s ratio of management compensation to its performance relative to its industry peers ratio. We might add to that information from news and social media on management engagement with its employees, customers or community<sup>10</sup>. Also, Carl Icahn suggests that there is a relationship between good Board of directors and good management<sup>11</sup>. If that is indeed the case we can add information on corporate governance as part of this measure.

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7A 2014 study by McKinsey concludes that most companies fall short in the execution of their sustainability programs. McKinsey’s conclusions over look, however, what the cause for poor execution might be. One of the findings of the study (which was not emphasised in the study) was that most companies have poor HC practices, which is very likely the reason for their inability to execute their sustainability programs – after all you need your employees to be on board to be able to execute any firm initiative. This hypothesis will be investigated in a follow-up research

8 The information on compensation is attainable and identifiable, as it is required by the SEC.

9 See definition at <http://corpgov.net/library/corporate-governance-defined/>

10 In this day and age of intense social media where every piece of information is immediately routed to Twitter, it might be possible to find information that is also related to management behavior. There are already some algorithms to extract data from Twitter.

11 This point should be investigated further either with an empirical research or with a survey.

Measuring the secondary effect means trying to estimate the quality of the company's HC practices. The information that could be attainable and quantifiable is information on employee turnover, layoffs, out sourcing, salaries and compensation. As discussed we will create proxies in relative terms (i.e., relative to industry peers). Any information on training or career planning is not publicly available, but the proxies that we can measure might suffice. For example, if a company has a high employee turnover (in relation to its peers), then it is quite likely that it does not invest much in training or career planning. We can add to that information from news and social media, such as surveys (that we can often find on the web) about best companies to work for. We might be able to use this type of survey as a benchmark for our proxies.

A different approach to finding quantifiable proxies for HC practices would be to infer this information from Icahn and Buffett investments. Their investment holdings are publicly available information. We could analyse their holdings in an attempt to find quantifiable indicators that may signal quality of management or HC practices and backtest these indicators to investigate if we could use them as proxies.

The role of HC investment is essential to understanding a firm's value and thus instead of neglecting it, we should do our best to quantify and include it in our quantitative models. To find the best quantifiable proxy we may need to apply all the methods suggested above and then cross validate them with case studies which integrate qualitative and quantitative analysis.

## **Looking at the Whole Picture**

From the above discussion it is apparent that: (1) quantitative methods are very powerful in their ability to retrieve and analyse data, especially in this era of – Big Data. Therefore, they should have a place in the investment process and its decision making, alongside qualitative methods (if information cannot be quantified but can be assessed qualitatively), and; (2) good HC practices lead to an increase in the firm's future financial performance and an increase in a firm's value. HC information, however, is difficult to attain and quantify and thus more often than not is being neglected in most investment processes.

There is no right way or wrong way to evaluate an asset or financial markets and no "exact" or "correct" process exists. Although, in finance we tend to use math to represent asset and market values, these are merely approximations of reality and unlike in hard science these mathematical models do not represent an exact formula, with an exact solution, and thus should not be treated as such. Analysts and portfolio managers can only put their best effort to come up with the "best" estimate of an asset value or markets.

Consequently, all information that is available to assess the value of an asset is invaluable, and all investment methods have merit – Quantitative and Qualitative methods; and within the quantitative, all investment methodologies have merit – Fundamental, Macroeconomics, Technical and Quant. Each methodology dissects different aspects of the market and market behaviour and the integrated analysis brings together the full story of market behaviour or asset value. The qualitative method adds information that the quantitative method is not able to capture and assess, and if ignored the investment process might be omitting valuable information, such as the information on HC practices, from its analysis. Using all information (and all investment processes) provides a holistic picture of equity investments and the estimation of asset values.

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## MODIFIED REPLACEMENT COST AS THE NEW APPROACH TO ASSET VALUATION

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**Abstract.** *The paper is aimed at the issues associated with valuation of assets and its impacts on determination of an enterprise value. Financial statements prepared on the basis of historical cost have been often criticized by both theoretical and practical public. At the same time there is an effort to apply the fair value approach more often. It is important to pay attention not only to impacts of asset valuation on financial statements, economic result and results of accounting units performance assessment, but also to potential influence of these factors on determination of company value, especially if revenue methods are applied, which are based on data from company books. The aim of the paper is to demonstrate the proposal of new method for valuation of assets that should eliminate the difference between historical prices and real value. This method may become a basis for development of a new approach to company value determination.*

**Key words:** *assets, equity, economic result, company value, financial statements, fair value, modified replacement cost*

**JEL Classification** *G12, G17, G32, M41*

### Introduction

With the development of capital markets, transactions with companies have been gaining importance recently. Not only these but also other situations require a detailed knowledge of a company health as well as its value.

Depending on the purpose the valuation of a company is done for, a particular method of valuation is selected. In vast majority of cases valuation is based on accounting data, despite they are often criticized and many experts are convinced the accounting data should be converted to market values.

Separation of accounting from real economic situation is impossible whereas the issues associated with valuation of assets and liabilities is quite crucial, not only because of impacts on financial statements as a basis for managerial decisions, but also in connection with the increasing demand for the knowledge of accurate value of an enterprise.

The content of this paper, with regard to valuation of assets as well as determination of a company value, is based on the precondition of a public limited corporation not listed on a stock exchange, with intentions of sale to an independent third party or entering stock exchange. For this purpose, in most cases, market and possibly also combined valuation methods are applied and preferred by theoretical as well as vocational public.

Represented are the discounted cash flow and economic value added (EVA) methods. The economic value added method and its modifications since the nineties of the past century

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are subject to frequent discussions. The analytical tool of the economic value added was developed back in 1982 by the consulting team of Joel Stern and G. Bennet Stewart. Soon it became recognized by prominent companies as a new approach of viewing companies and their profitability from new angles and also as an approach closely associated with shareholder needs.

Calculations of these indicators may be affected or complicated by different accounting systems. The following facts are considered as insufficiencies of accounting indicators:

- potential effect on the amount of profit reported, even using the legal accounting procedures, often quite significant;
- accounting indicators do not reflect time value of money and especially the associated risks (Mařík & Maříková, 2005).

A detailed look at a company balance sheet reveals that the key issue is the valuation of long-term assets without taking the effects of inflation into consideration (Gordon, 1977). Short-term assets and money on corporate bank accounts are items circulating throughout the year, whereas money in banks is subject to interest rates including inflation. Therefore we can say that with regard to these assets the criticism is not so pointed as short-term assets, due to their nature and definition, reflect current market conditions.

With regard to criticism of financial statements and exclusion of risks we should claim that the applicable legislation as well as conditions embedded in the IFRS conceptual framework force the accounting units to thoroughly consider all potential risks, losses and value cut-downs. For this purpose accounting units use reserves and adjusting entries for example. Therefore further reflection of risks in financial statements is rather questionable.

It is obvious that the issues associated with valuation of long-term assets are the key topic. The content of the paper suggests options for implementation of criticized inflation rate into the traditional valuation basis in the form of historical prices, thus eliminating differences resulting from application of revenue methods in connection with determination of company value.

The methodology of the paper is based on the literature overview, which not only covered scientific publications but also some scientific articles published on the subject matter. For the purposes of this paper the author used data from a real public limited corporation (A) engaged in industrial manufacture, from the accounting period of fiscal year 2013 (i.e. from 1 April 2012 until 31 March 2013).

### Purpose of Valuation

In bookkeeping valuation is aimed at determination or assignment of a value to individual items of assets and liabilities. Interpretation of assets and liabilities using a certain value has a significant impact on reported information on financial situation of a company and therefore the selected method of valuation is crucial not only for financial statements but also for assessment of financial situation, performance and value of a company. It is an important aspect of each financial accounting especially because the selected way of valuation affects the content and predicative capacity of all financial indicators determined using company books (Fireš & Zelenka, 1997). There are impacts on total amount of assets and liabilities, equity and economic result. The key issue of the current situation in valuation is the absence of solution regarding what valuation basis is suitable for specific assets and liabilities and when to use it. (Borys, 2011) Vast majority of new approaches try to introduce paradigms directing to changeover from historical cost to other values that would better reflect economic benefits from items subject to valuation.

There are two extreme views of the valuation process. On the one hand there are those who believe that valuation is a hard science, where there is a space for analyst views or human error. On the other hand there are those who feel that valuation is more of an art, where savvy analysts can manipulate numbers to generate whatever result they want (Damodaran, 2006).

This matter is closely associated with the going concern principle, i.e. assumption of going concern in foreseeable future. If it is known that the company will terminate its business activities soon, the approach to valuation will be different than in case when there is an assumption of future activity (Dvořáková, 2011). This not only applies to valuation of an enterprise in general, but especially to valuation of individual balance sheet items. Therefore the results obtained reflect various combinations of historic data, current information as well as awaited future facts. The following content assumes the going concern principle with the intention to sale the company to an independent buyer or to join the stock exchange. The attention and all the procedures are focused on public limited corporations not listed on the exchange stock.

Besides other accounting principles and rules, the due care principle has a particular importance in connection with valuation, as it requires to document transactions and facts without any overvaluation of assets and revenues or undervaluation of liabilities and expenses.

### *Valuation Consequences*

Primarily it is necessary to emphasize the impact of valuation method on the economic result, financial statements and also calculations of financial analysis and other methods for assessment of company financial situation and performance. Valuation of assets and liabilities is quite controversial and essential area forming the content and predicative ability of financial statements. The application of valuation bases depends on the time of valuation, on system used for preparation of financial statements as well as on IFRS environment or legislation framework of the relevant country and the related definitions of assets and liabilities. The effects of the selected method of valuation on enterprise performance evaluation are well known, however there may be some serious implications associated with the enterprise value determination.

Experts engaged in valuation of assets and liabilities agree that keeping accounting books in historical prices is a real issue. Valuation of assets using historical prices does not reflect changes in market prices of assets, ignores changes in buying power of monetary unit and obviously biases the economy in common year (Knápková & Pavelková, 2013). Also inflation rate is not reflected considering the traditional conception of bookkeeping. As for selected assets and liabilities, there are some legislative provisions that require depreciation of long-term assets and re-valuation of some items from financial statements to real value as of the balancing day. Using these measures companies enforce the due care principle and bring the value of their assets closer to reality. At the same time everything is based on prices that are well documented, may be objectively determined and are attributable to individual items.

If other valuation basis than historical cost approach would be applied, a deviation from the essence of accounting profit to economic profit, currently being based more or less on subjective estimations with high potential of manipulation with the results obtained, may happen.

The issue of valuation, preparation of financial statements and also the question of profit are quite topical. New approaches are coming and therefore it is necessary to stop for a while and remind the primary function and purpose of accounting and the related data. Accounting

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information must remain independent. It should be used for decision-making and it is crucial for decisions regarding future of an enterprise. There should be no pressure on adjustment of results to subjective views.

At the time with market environment changing faster than ever before, more pressure is applied on monitoring and reduction of costs as well as improvement of performance and competitiveness of enterprises. It is therefore necessary to determine the impacts of different approaches to valuation on company value assessment. Accounting must be closely connected with economic reality. Variations in accounting because of national legislations and also because of incomplete harmonization at international level result in possibility of different outcomes in financial statements, affecting the accuracy of company value assessment.

### The Essence of Basic Valuation Bases

Both the national legislation as well as the International Financial Reporting Standards (hereinafter referred to IFRS) recognize valuation as of the accounting transaction date and valuation as of the balancing date. While valuation at acquisition of assets is assured using acquisition prices or real factory costs, the valuation of assets and liabilities as of the balancing date may be carried out using the following valuation methods, based on the conditions and definitions of the IFRS conceptual framework.

#### a) Historical cost

This valuation basis is used by most accounting systems as valuation based on acquisition prices. This means it is the acquisition price of assets. In this case liabilities are valued by an amount of money necessary to settle them (Fireš & Zelenka, 1997). Also liabilities may be valued at the level of income that would be received in case of their assignment (Malíková & Horák, 2009). This is the basic valuation method for financial accounting and financial statements.

#### b) Current price/Replacement cost

Current price is a price that would be necessary to acquire an asset at the time of its posting into company books. Often this term is replaced by "replacement cost" term.

#### c) Realizable amount

Assets are valued at the level of cash collectable in case of their due sale (Dvořáková, 2011). In connection with the definition of this valuation basis it is necessary to thoroughly consider the question of costs on finding the potential buyers and also their willingness to pay. Supply and demand are interacting here whereas an asset may be finally sold for higher or lower price than the real value. Upon introduction of the final value into financial statements, they would be biased. Considering the facts mentioned above, it is a suitable valuation basis for the determination of a company liquidation value, but definitely not for revaluation of assets (liabilities) in accordance with the going concern principle.

#### d) Present value of expected cash flows

This method is based on valuation of assets and liabilities using discounted values of the future net cash flows. With application of present value as a valuation basis it is a bit problematic to select the correct discount rate so the predicative capability and comparability of financial statements remain unaffected.

It is very important to mention that while the accounting profit based on historical costs (ex post profit) is a periodical profit, the profit based on the present value is a theoretical profit only, i.e. a profit expected in the planned horizon of time (ex ante - economic profit), a profit reflecting expectations regarding future cash flows.

Recently the valuation of assets and liabilities using the fair value conception has been discussed quite frequently. This form of valuation appeared for the first time back in 1982 in IAS/IFRS standards (20, 39, 40, 41). Real value is an amount at which an asset could be exchanged or a liability settled within transactions amongst unrelated parties under common conditions (Kovanicová, 2006).

Supporters of new approaches say that if the accounting data will be more reflecting the economic reality and will be more transparent, investment risks will be lower and so will be the required rate of return of capital invested. Therefore they prefer valuation of all assets and liabilities using fair value and adjusting the profit and loss statement accordingly (both extent and content). Here it should be however emphasized that fair value is not available for all assets and liabilities. Market should not be an idol and accordingly everything the market touched should not be considered as real (Kovanicová, 2002). Another question is whether a market is able to provide really transparent information.

Final accounts should give a true and accurate picture of financial and material situation of an enterprise - therefore the selected valuation method plays quite important role. Companies may use all the valuation bases mentioned above, but because of the content of individual standards, as of the balancing date historical cost and fair value principles are the most frequently used ones.

#### *Comparison between Fair Value and Historical Cost*

Because of the current situation and the frequent criticism of historical cost and considering the obvious benefits of fair value conception, we should compare these two valuation bases and determine a theoretical standpoint saying which of them is suitable for financial statements and which for company value assessment.

The fair value method has been subject to research for many years. In 2011 the international accounting standard IFRS 13 was adopted with the effective date of 1st January 2013. Its aim was to unify approaches to this valuation basis within IFRS and improve the quality of information reported. The aim of IFRS 13 was unification of approaches to fair value application across individual IFRS standards that require, recommend or allow the fair value method application. IFRS 13 however does not set in which cases accounting unit may or may not use fair value method or how to deal with effects from revaluation to fair value. This is covered by standards applicable to individual segments of assets and liabilities. (Dvořáková, 2011)

*"IFRS 13 defines fair value as the price that would be received to sell an asset in an orderly transaction between market participants at the measurement date. The definition of fair value in IFRS 13 reflects an exit price notion that is the market price from the perspective of a market participant who holds the asset. IFRS 13 points out that fair value must be a market-based, not an entity-specific measurement"* (Paela & Maino, 2012, p. 4).

Fair value is a price that could be received - as of the valuation date - for an asset sold or paid to settle a liability within a common transaction amongst market participants (Penman, 2007; Laux & Leuz, 2009). A common market transaction means a hypothetical transaction. It is a price from the seller's or the one's who settles the liability point of view (exit price). The price should be based on the central, i.e. the most important market for the particular asset or

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liability. It is the market where the majority of transactions with the asset to be valued is realized and also the most active market. The standard should also mention how to prevent from reflection of individual intentions, coming out of the current situation of accounting unit, into the transaction realized. Also there is no information whether the primary market should be a domestic or foreign market, a global or a market associated / not associated with the accounting unit's branch of business. This is especially important in case of entry on the foreign stock exchange as companies aiming to do so must prepare their financial statements in accordance with IFRS. Therefore - to assure the comparability with other entities - it would be appropriate to come out of the same market as a reference. It should always be the main market, i.e. market where the majority of transactions with the given asset or liability is realized. According to the standard such market should be selected even if the price in other market is lower.

In connection with the fair value principle we should mention that the conceptual framework defines qualitative parameters of financial statements, such as intelligibility, relevancy, reliability and comparability. Information presented in the financial statements must be neutral, while most of the facts introduced into financial statements are somehow connected with uncertainty. This is why the due care principle must be followed, i.e. assets must not be overvalued and liabilities undervalued. Financial statements should be comparable over time and also amongst various companies. Would they be comparable with market prices? For example long-term tangible assets are shown in the balance sheet at historical costs adjusted by depreciations (Brealey, 2012). This means there is comparability over time, as we know the initial acquisition price and the value of assets is changing year after year due to wear and tear. We may claim that it is similar with fair value, as we also know the initial acquisition price and also there is the annual revaluation to fair value. However in this case we do not know what factors influence the determination of price in the main market and also how the reality of the accounting unit is reflected in the value.

Also it should be emphasized that despite IFRS13 was issued, the Conceptual Framework is not yet amended and therefore fair value conception is not included in the valuation bases presented. The most similar, in terms of definition, would be the common (replacement) cost and realizable value, both aimed at the current market conditions. Another important aspect of fair value conception are costs associated with searching for prices of selected assets and liabilities in main markets.

From the very beginning the fair value conception has supporters as well as opponents. It is a very complex approach and even the EC standard from 2001 does not impose an obligation on member countries to follow it. The real value is - from the investor decision-making point of view - mainly questioned in USA, especially in connection with the financial crisis. When searching for causes and causers of financial crisis in USA real values were subject to multiple reviews and verifications in terms of their transparency and validity, especially in cases where no real market exist. At the beginning of October 2008 the US congress adopted the law aimed at stabilization of economy. The law empowers the US Stock Exchange Commission (SEC) to suspend the validity of FASB Fair Value Measurement standard application if necessary or appropriate in the public interest or for the protection of investors (Žárová, 2008).

Valuation on the basis of historical cost comes out of acquisition price. The clear advantage of this valuation basis is its demonstrativeness and easy implementation. On the other hand this valuation method has very low predicative ability because most of assets depreciate (or appreciate) over time. But is it correct to say that the change in value reduces predicative ability? For example fixed assets are depreciating, thus reducing their accounting and real value - but this does not mean lower predicative ability. Predicative ability is impaired by the fact the financial statements do not reflect effects such as inflation or risk

(Hughes, Liu & Zhang, 2004). While preparing financial statements, mandatory procedures are applied, assuring the necessary tending to reality. This is the advantage represented by comparability of impact on economic result over time.

Financial statements are prepared with a view of presenting the financial position of an enterprise on a particular date and displaying the results achieved during an accounting period. Information provided in financial statements should be relevant and reliable. Traditionally, financial statements of every concern are prepared on historical cost basis of accounting. Though there are some advantages of historical cost – based accounting, such as objectivity, verifiability etc. Income statement prepared under such basis does not indicate true earning capacity of the enterprise and the balance sheet prepared under such basis does not exhibit true financial position of the enterprise, particularly in the event of changing price level (Bhattacharyya, 2011).

The most obvious problem with historical cost is that it will gradually become more and more out of date. It will describe the value of an asset as it was several years ago. This is inappropriate when we have already said that a balance sheet is supposed to give us a picture of an entity today. Furthermore, the higher the level of inflation then the more inappropriate the historical cost valuation will become, as the difference between today's cost and the historical cost gets wider (Britton & Waterston, 2006). Here again we agree with the statement regarding inflation - but we cannot support the opinion that in case of historical cost valuation the value will remain as few years ago.

Currently the fair value principle is the preferred way to capture the market reality in financial statements of an enterprise. However despite all the benefits mentioned, we must acknowledge that the fair value application is the implementation of subjective approaches into valuation of balance sheet and P/L items and also that this valuation basis is considered as one of the possible causes behind the financial crisis (Laux, Leuz, 2009). The pressure on changing the approach to preparation of financial statements, so that they reflect accounting and not the market situation, has been constantly increasing. In any case it is important to stay aside of all valuation methods and thoroughly follow the basic accounting principles and rules in consideration of specific company environment and especially the purpose financial statements are prepared for. Reichelstein (2008) explains: *"The historical cost principle is ubiquitous in accounting. Under generally accepted accounting principles (GAAP), most tangible assets are recorded at historical cost on the balance sheet. Subsequent depreciation and amortization expenses in the income statement then reflect the initial expenditure of past asset acquisitions. Economists understandably worry that such expenses reflect largely costs that are sunk and therefore have little economic relevance with regard to current economic decision."* (p. 824). Table 1 shows the summary of basic pros and cons of historical cost and fair value valuation bases.

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**Table 1: Fair value vs. Historical cost comparison**

Pros		Cons	
Fair Value	Historical cost	Fair Value	Historical cost
Price based on market	Demonstrative	A hypothetical price (quantification of inflation and risk)	Inflation rate and risks not included
Inflation rate and risks included	Easy realization	It is not determined how to keep the market reality only and eliminate subjective and individual intentions of sellers and buyers	Does not allow to reflect increase of prices
	Objectivity	More detailed specification of main market (domestic x foreign, associated with the branch of business or not) is missing	
	Valuation base in most countries	Main market does not exist for all assets (the impact of segmentation)	
		Not yet introduced as one of the valuation basis within the conceptual framework	
		One of the potential causes of financial crisis	
		Transaction costs associated with fair value determination	
		Standards allow to deviate from fair value - this reduces comparability of companies as one of the main fair value purposes	

From the table it is clear that following a detailed review of the fair value issues, we currently see more cons than pros. Because of the pros, mainly associated with the valuation using acquisition prices, it is appropriate to make use of this valuation basis for the preparation of financial statements, and to find out the way how to potentially reflect the effects of inflation, risks and other factors on selected items.

Acquisition price as a valuation basis is a well-proven method of valuation (Gordon, 2002) reflecting situation of a particular entity. A reason for failure, not only in most of companies, is the negative attitude of people towards changes of any kind. The question is

whether this is the best example of "do not change what is working well" approach. Historical cost is the most frequently used valuation basis. Companies in almost all countries use it to prepare their financial statements. This is why these companies may be compared - because of the uniform approach to preparation of financial statements and also because this approach is based on environment, conditions and particular situation of accounting units, which is one of the main purposes of final accounts - to give true information on financial situation and performance of an entity. At the end we must say that for the purpose of a company value determination it is appropriate to come out from valuation based on historical costs. This applies to Czech legislation environment as well as the international accounting standards. As for items that require valuation or revaluation to real value, it should be determined (in order to assure comparability) how to proceed uniformly.

## **New Approach to Asset Valuation**

Financial statements give clear picture of assets and liabilities, based on historical costs, not only to management, but also to other entities concerned, such as suppliers, customers, financial institutions, government and users of financial information in general. Because of the growing criticism of this information, as it does not take the buying power of money into consideration, there is an effort to transform accounting data so they not only reflect, to the maximum extent possible, the current value of assets, but especially the market situation.

From the current legislatively approved valuation bases, these requirements are fully met by replacement cost. As already mentioned, replacement cost refers to the amount that an entity would have to pay to replace an asset at the present time, at current prices. External users of accounting information would appreciate the presentation of financial statements at replacement costs as this would eliminate the main disadvantage of historical costs (Kovanicová, 2006).

The key negative aspect of the replacement cost valuation is the fact that its application is quite administratively demanding, especially due to permanent revaluation of assets. Another negative aspect is an obvious subjectivity. These are the reasons why this valuation basis is used to a limited extent only.

Here it is quite important to mention that replacement cost is a simulated price based on the existing economic conditions. Because of that there is an effort to find such valuation that would implement the benefits of historical cost approach, including the consideration of the buying power of money, and at the same time eliminate the negatives of fair value, mainly associated with subjectivity.

### *Sum Insured as a Basis for Determination of Modified Replacement Cost*

The basic idea behind the definition of the modified replacement cost is the effort to keep historical cost as the main and the most frequently used valuation basis and also to respond to the growing criticism of historical cost approach. The task is therefore to find the way how to implement the buying power of money into financial statements prepared on the basis of historical costs.

One of the ways providing more objective insight into the value of assets of the particular accounting entity, not much affected by subjective views but still reflecting the market conditions and inflation rate, is the sum insured. It is the amount that would have to be used for restoration of assets in case of their sudden loss / damage. The sum insured is the highest

## MODIFIED REPLACEMENT COST AS THE NEW APPROACH TO ASSET VALUATION

possible material damage that may be suffered due to insured event (Němeček & Janata, 2010).

Together with the sum insured we should define two more terms – replacement value and time value. Replacement value is the price one would have to pay in the given place and at the given time to get the same or at least comparable item once again, whereas time value is the price of the item right before the insured event, determined on the basis of the item new price (Němeček & Janata, 2010; Ducháčková, 2003).

This standpoint for the determination of the modified replacement cost is a clear advantage because it is a value coming out of market conditions, including inflation, risks and demand / supply conditions, eliminating subjectivity. Before the theoretical definition of the modified replacement cost will be revealed, we should mention how the replacement and the time value are defined.

To determine the replacement value, two different approaches may be applied. The first one is based on acquisition price adjusted by the inflation rate in the relevant branch (e.g. building industry, engineering etc.). It is a so called indexing method. The second one makes use of an expert opinion. The price is therefore based on the sort and nature of assets. The item is assessed by an expert who determines its value. For example real estates are valued on the basis of building volume, nature of structure, materials etc. The disadvantage of this approach is that the expert or vocational valuation firm is quite expensive. As for the time value, it is based on the new price adjusted by the level of wear and tear (in this case technical wear-out).

Based on the above mentioned method for determination of the sum insured, we can deduce a theoretical standpoint for the modified replacement cost. The basis are assets at acquisition prices and their conversion to real value using the inflation price index.

$$MRC = HCA_T \times K_i \quad (1)$$

Where:

MRC is the modified replacement cost

HCA is the acquisition price of an asset (historical cost)

T is the year of asset acquisition

$K_i$  is conversion coefficient

$$K_i = \frac{Ip_1}{Ip_0} \quad (2)$$

Where:  $K_i$  is the conversion coefficient

$Ip_1$  is the price index in the year of final accounts compilation

$Ip_0$  is the price index in the year of asset acquisition

The price index is quite important. In order to get the comparable data and to eliminate subjectivity and errors, it would be appropriate to consider price indices issued by statistical institutes of relevant countries. The reason is that in most EU countries only Laspayeres and Paasche indices are used.

For standardization of the calculation procedure of the inflation price index, the following formula may be applied:

$$I_p^L = \frac{\sum_{i=1}^n \frac{p_{1,i}}{p_{0,i}} \times p_{1,i} \times q_{0,i}}{\sum_{i=1}^n p_{0,i} \times q_{0,i}} = \frac{\sum_{i=1}^n I p_i \times p_{0,i} \times q_{0,i}}{\sum_{i=1}^n p_{0,i} \times q_{0,i}} = \frac{\sum_{i=1}^n p_{1,i} \times q_{0,i}}{\sum_{i=1}^n p_{0,i} \times q_{0,i}} \quad (3)$$

Where:

$i = 1, 2, \dots, n$  represents index of relevant representative included in the selection

$I_p^L$  is the Laspeyres price index

$p_{1,i}$  is the price of representative in common period

$p_{0,i}$  is the price of representative in basic period

$p_{1,i} \times q_{0,i}$  are weights, i.e. revenues from basic period

$I p_i = p_{1,i} / p_{0,i}$  is an average quantity, i.e. change of price in the relevant period

The difference between the Laspeyres and Paasche indices is that weights of the Laspeyres index are revenues from basic period while the weights of the Paasche index are revenues from common period.

The key benefit of such modified replacement cost determination is its transparency and the fact it is based on real acquisition prices. Also it is objective because of inflation rate incorporated. Another benefit is the applicability of this approach in any company, providing the management with an opportunity to get a quick insight not only into accounting, but also the real value of assets. At the same time the calculation allows to check the sum insured determined by the insurance company (whether the insurance proposal presented by the insurance company is accurate and if not, why).

In order to determine the modified replacement cost, there are two approaches possible. Theoretic approach is based on the application of the above mentioned calculation, while the practical is based on adoption of the sum insured set by the insurance company as the modified reproduction cost.

#### *Impacts of Modified Replacement Cost Valuation on Financial Statements*

One of the major impacts of the selected method of valuation is not only the impact on financial statements and assessment of company financial situation and performance, but also the impact on determination of company value.

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The following simplified example will demonstrate impacts of modified replacement cost application on the balance sheet of selected company. Individual steps are shown in table 2. Table 3 shows the supporting calculation of conversion coefficient.

**Table 2: Basic data in thousand CZK**

Asset	1 Year of acquis.	2 Acquisition price	3 Deprec. period (years)	4 Deprec (2 / 3)	5 Deprec. reserves	6 Depreciated price (2 - 5)	7 Conversion coefficient	8 MRC (2 x 7)
AS1	2010	2 719	5	544	2 175	544	1,100	2 991
AS2	2011	2 199	5	440	1 319	880	1,061	2 333
AS3	2012	15 753	12	1 313	2 626	13 128	1,015	15 989
AS4	2012	7 414	5	1 483	2 966	4 448	1,015	7 525
Total AS	x	28 085	x	3 779	9 086	18 999	x	28 839
AB1	2010	17 169	30	572	2 289	14 880	0,980	16 826
AB2	2011	8 747	30	292	875	7 872	0,982	8 590
AB3	2012	15 900	30	530	1 060	14 840	0,988	15 709
Total AB	x	41 816		1 394	4 224	37 592	x	41 124
Total	x	69 901		5 173	13 310	56 591	x	69 963

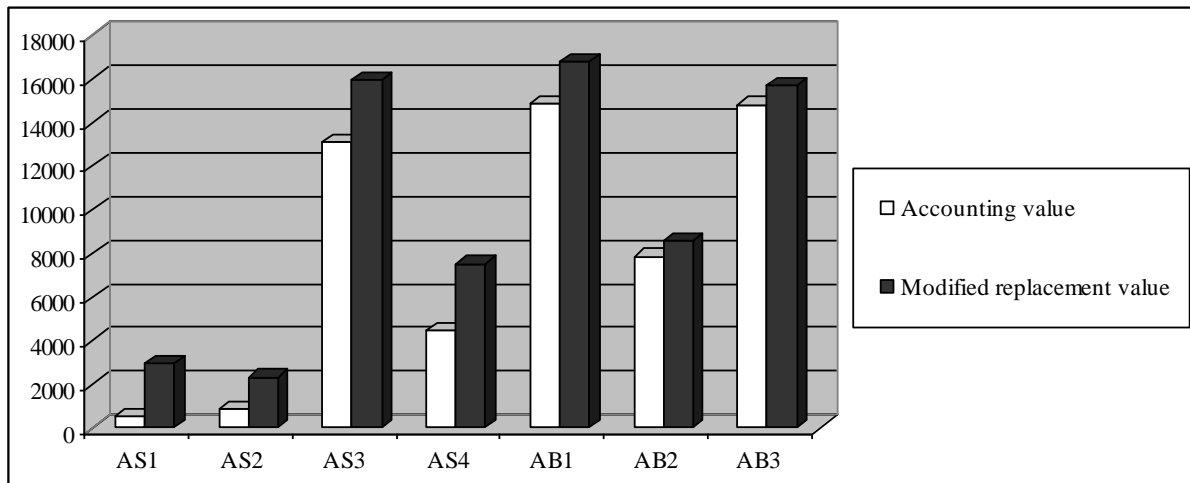
**Table 3: Price indices and conversion coefficients in relevant years**

Year	2010	2 011	2012	2 013
Price index - machines	447,3	463,7	484,7	491,9
Ki – machines	1,100	1,061	1,015	1,000
Price index - buildings	847,8	846	841	831
Ki - buildings	0,980	0,982	0,988	1,000

AS assets represent machinery while AB assets represent buildings. If multiple assets are acquired in the given year with the same period of depreciation, they were - to simplify the example - grouped together (AS or AB). Another simplification is putting assets into use as of the beginning of the accounting period in all cases.

From the table 2 above it is obvious that at the end of the accounting period of fiscal year 2013 (from 1 April 2012 until 31 March 2013) the modified replacement cost of all assets was CZK 69 963 thousand, compared to the accounting value of CZK 56 591 thousand. For better transparency the graph in figure 1 shows difference between the accounting value and the modified replacement value of assets.

**Figure 1: Difference between accounting value and modified replacement cost of individual assets (thousand CZK)**



In connection with the application of the modified replacement cost there is a question how to proceed in case of already depreciated assets. It would be appropriate to adjust the newly calculated modified replacement cost by technical wear and tear. The level of wear and tear may be determined by various means, e.g. based on the expected lifetime and the actual period of use of the relevant asset.

The difference from revaluation of assets to modified replacement cost will be shown as a separate item of equity - see table 4.

**Table 4: Impact of revaluation to MRC on company balance sheet (thousand CZK)**

Assets	Accounting value	MRC
Long-term intangible assets	1 001	1 001
Long-term tangible assets	56 591	69 963
<b>Long-term assets</b>	<b>57 592</b>	<b>70 964</b>
<b>Current assets</b>	<b>148 921</b>	<b>148 921</b>
<b>Accruals</b>	<b>163</b>	<b>163</b>
<b>TOTAL ASSETS</b>	<b>206 676</b>	<b>220 048</b>
LIABILITIES	Accounting value	MRC
Registered capital	37 740	37 740
Capital funds	91 877	91 877
Reserve fund	3 143	3 143
Undistributed profit from past	168	168

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Economic result	18 593	18 593
Revaluation difference		13 372
<b>Equity</b>	<b>151 520</b>	<b>164 891</b>
<b>Reserves</b>	<b>5 080</b>	<b>5 080</b>
<b>Long-term liabilities</b>	<b>30 323</b>	<b>30 323</b>
<b>Short-term liabilities</b>	<b>18 421</b>	<b>18 421</b>
<b>Transitional accounts</b>	<b>1 331</b>	<b>1 331</b>
<b>TOTAL LIABILITIES</b>	<b>206 676</b>	<b>220 048</b>

Following revaluation to modified replacement cost the value of long-term assets increased from CZK 57 592 thousand to CZK 70 964 thousand. At the same time the equity increased from CZK 151 520 thousand to CZK 164 891 thousand.

Based on the accounting values covered in financial statements and the modified replacement cost it is possible to calculate the following ratio, providing additional information to company management for decision-making purposes.

$$BOOK - to - MRC \text{ ratio} = \frac{BOOK \text{ Value}}{MRC \text{ Value}} \quad (4)$$

If the result equals to 1, company management may pay out dividends in full amount. The result from 0 to 1, i.e. accounting value lower than real suggests paying out less than intended on dividends. If the result is higher than 1, higher dividends may be paid out.

The indicator gives information whether the asset value attributable to a single share is higher / lower than stated in company books.

Now it is the best moment to explain the links between the above mentioned steps and the company value assessment as well as the necessity to select the proper valuation basis.

## Effects of Differentiated Valuations on Company Value Assessment

Approaches to valuation of companies differ depending on the reason of such valuation (change of ownership, sale, IPO, internal purposes, business performance assessment etc.). The aim is to determine the value in monetary units.

The value paradigm has been constantly evolving and despite each company is formed by assets, costs, revenues, profit, loss and other quantifiable items; an objective value does not exist. The above mentioned aspects point to the fact that there is no clear algorithm that would allow to determine a company value and also that this value would be dependant on the purpose and the entity itself. There is a consensus saying that the assessor should well think about the category of value he wants to obtain. The value standards determination is therefore based on the above mentioned factors affecting the valuation process depending on the user of information (value).

- **Investment value**

The investment value standard should answer the question what is the value of a company from the particular buyer's point of view and is therefore intended for a specific entity the individual expectations of that will be reflected also into future. This approach seems to be appropriate for acquisitions / sale of companies and for decisions whether to redevelop or liquidate a company.

- **Market value**

In contrast to investment variant, this is the value that should not be dependent on a specific entity. It is based on the assumption that there is a market with companies where demand and supply interacts which leads to a market price determination. Market value is most frequently used in situations where buyer is unknown and the current user needs to know for how much the company could be sold. This method is also used if there are intentions to join the stock exchange (IPO).

- **Objectified assessment**

It determines a value that may be considered as relatively indisputable, is based on generally accepted data and was calculated using specific principles and procedures. This approach should be applied for example in connection with a request for credit or other situation emphasizing the current situation.

- **Non-market value categories**

Other value categories include for example the residual material value, value for taxation and others. The valuation standards do not clearly stipulate what values are covered here.

Depending on factors that determine the category of value and in accordance with the goal the valuation is set to meet, various methods may be applied. As in this case the going principle is followed and the main valuation goal is the entry of company to exchange stock or its sale to an independent buyer, attention is paid to so called revenue methods.

This group of methods is based on the perception of a company as an economic entity the value of that is determined according to assumed benefits for the holder. The revenue-based valuation, considered as the most accurate from theoretical point of view, includes the discounted cash flows (DCF) method. Also there is the method of capitalized net revenues. Experts from real business environment often combine various revenue-based valuation methods where economic value added (EVA) and market value added (MVA) are represented.

Since the nineties of the past century a considerable attention is given to the methods based on the Economic Value Added (EVA) and Market Value Added (MVA). We can consider the revenue approach as the most appropriate for valuation of companies, both theoretically and practically (Šabolovič, 2011). Calculations of these indicators may be affected or complicated by different approaches to bookkeeping.

Making good decisions usually depends on having good information, and value is the performance metric that uses the most complete information. To understand value creation, there is a necessity to adopt a long-term perspective, manage all cash flows across both income statement and balance sheet (Copeland, 1994).

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EVA measures the difference between the net operating profit after tax and the cost of the capital. A positive EVA indicates that value has been created for shareholders; a negative EVA signifies value destruction (Young, 1997). Here is the basic calculation of EVA:

$$EVA = NOPAT - WACC \times C \quad (5)$$

Where:

NOPAT is the net operating profit after taxes

WACC is the weighted-average cost of capital

C is invested capital

For your reference here is also the calculation of WACC:

$$WACC = r_e \times \frac{E}{C} + r_d \times \frac{D}{C} \times (1 - t) \quad (6)$$

Where:

WACC is weighted-average cost of capital

$r_e$  is the cost of equity

E/C is the ratio between equity and capital (E+D)

$r_d$  is the cost of debt

D/C is the ratio between debt and capital (E+D)

t is the corporate tax rate

The key issue with EVA calculation is the adjustment of accounting data so they reflect the real market situation. There is a list of steps compiled by authors of the indicator; however it is protected as a trade secret.

Experts dealing with this issue describe the most frequently done steps as follows: separation of non-operation assets from total assets, adjustment of assets value by debts subject to no interests, exclusion of extraordinary items and conversion of accounting assets to real assets.

From the basic formula for EVA calculation it is obvious that the results will vary depending on the selected method of assets and liabilities valuation. This is because the amount of equity changes following revaluation of assets to modified replacement cost. Here is the space and also the necessity, either using the above mentioned ratio between BOOK and

MRC or any other approach, to find another way or method for valuation of public limited corporations, eliminating these effects of different valuation bases.

## Conclusion

Valuation of assets has been constantly quite topical and important issue. The chosen valuation basis affects the amount of assets, liabilities and the economic result of an enterprise, as well as the predicative ability of financial statements and thus also the results of the company financial situation and performance assessments.

Despite the growing criticism of asset valuation on the basis of historical costs, especially due to their fast aging and a lack of reflection of the real market situation, the historical cost approach has still been the most frequently used valuation basis. Because of that accounting data and results obtained from assessment of financial situation of individual companies are comparable. Supporters of modern approaches are however anxious for more frequent use of fair value approach that reflects the market reality and include inflation (in contrast to historical cost). But also this approach has many disadvantages, especially high level of subjectivity, impaired comparability of financial statements or indicators as well as inapplicability to all assets.

The paper compared these two valuation bases and demonstrated a new approach to valuation of assets based on definition of historical cost, but eliminating all disadvantages of this valuation basis. It is a method of modified replacement cost, using the sum insured as a basis for valuation.

Data from the specific public limited corporation were used to show the steps for determination of modified replacement cost as well as impacts on the value of assets and own capital. Here we must emphasize once again that the paper is drafted from the point of view of a public limited corporation not listed on a stock exchange, with the goal of potential introduction to stock exchange or a sale to an independent third party.

The above mentioned concurrences will also significantly affect the related calculations, aimed at determination of company value, as they are based on accounting data. The company value assessment is a quite demanding process not only with regard to input data, but also selection and application of particular method depending on purpose of such assessment. Currently the most frequently used is the economic value added method. It is obvious that the result achieved will be highly affected by the selected method of valuation and the question therefore is which value will be the most accurate one. This is the reason why the current issue is to find out such procedure or method for company value determination that would eliminate potential variants resulting from different valuation bases. Using the accounting value and the newly constructed modified replacement cost a ratio "Book-to-MRC" was determined that could provide the company management with additional information and help at finding the new optimum method.

At the end we should mention that the assurance of comparability of data over time as well as amongst individual companies should remain important. And it is bookkeeping that provides us with comparable data thanks to the applicable statutory conditions and requirements.

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# THE EFFECT OF SOCIAL VALUE MEASUREMENT ON IMPACT INVESTMENT DECISIONS

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**Abstract.** *Impact investing has great potential to address social problems by tapping into investors' enthusiasm for underpinning activities that 'make a difference to society'. Measurement of social benefits can therefore influence investor choices as perceptions of non-financial returns vary. To understand such choices, financial returns, social and environmental returns (SER) and SER measurement should all be taken into account. There has, however, been little consideration of these aspects in an integrated way. To advance the debate, this paper explores a basic model which extends a standard utility function to SER and draws on insights from theories of knowledge. Indicative results when plausible parameters from research and historical trends are put in indicate (i) a tightness of resources for measurement; (ii) investors becoming less willing to accept lower financial returns when they are less confident about social returns; and (iii) an increased lack of willingness to accept lower financial returns where SER returns relate to intangibles that are harder to measure.*

**Keywords:** *Social and environmental returns, social value, impact measurement, impact investment*

**JEL Classifications:** *D81, G11, G14, H23*

## Introduction

Key networks such as the G8, World Economic Forum and signatories to the UN Principles for Responsible Investment have signalled support for action by investors to recognise wider social and environmental goals, both in investment decisions and reporting. Impact investing is already a major factor in sectors as varied as micro-finance, social housing, 'clean technology' and water purification (Clearly So, 2011), and the scope for further growth in the sector is huge (O'Donohoe et al, 2010).

Prospects for growth in this sector are enhanced the more that investors and advisers can harness measurement and assessment processes to place a value, implicitly or explicitly, on the wider social and environmental consequences of their choices. Such a theme is widely recognised – both from a corporate perspective (the 'triple bottom line' approach initially advocated in Elkington, 1997), an accounting outlook (the 'Blended Value' approach outlined in Nicholls, 2009), and in social investment (as with the 'Implied Impact' approach of Evenett and Richter, 2012). There has, however, been little conceptual modelling of the interplay as to *how* measurement of impact, level of impact, and financial goals together affect investors' decisions. One important exception, Grabenwarter and Liechtenstein (2011: 54-56), outlines a route to assessing impact within the context of an integrated finance/impact

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model; however this argues that there is no trade-off between financial return and social impact provided that the investor takes a professional approach. This leaves the inter-linkages of investors' perceptions of financial return, social return and measurement underexplored.

Yet equilibrium can depend greatly on the workings of measurement and information, as is clear from the explorations of multiple equilibria in markets involving asymmetric information initiated by George Akerlof, and the prediction of inefficient financial markets due to the non-zero cost of collecting information on financial assets set out in Grossman and Stiglitz (1980).

A range of practitioners into the processes of impact investing (Reeder et al, 2014) have testified that the measurement of SER is far from costless and far from readily transferable. Managers of impact investing funds frequently spoke of highly constrained budgets for measurement; and highly varying levels of interest among their clients into the social and environmental impacts of their investments. Procedural aspects (such as screening) tend to dominate, with much less attention given to outcomes and attributed changes in outcomes. Other research, such as Paetzold and Busch (2014), highlights other measurement issues, finding a lack of understanding about social investment preferences among fund managers, and a somewhat unfounded perception of additional volatility from social investments amongst clients.

This paper therefore aims to move analysis forward on both conceptual and empirical levels by considering (i) a basic model of investment decisions that integrates financial and non-financial value; (ii) an extension of the model to include choices between investing in assets as opposed to funding better measurement of the non-financial returns from assets; and (iii) implications when broad-brush empirical parameters are deployed.

### Model for integrating social and environmental returns into investment decision-making

Current standard models set out to maximise wealth over a series of distinct time periods. A natural extension of that approach is to draw a distinction between wealth ('w') and wider wealth ('ww'), where wider wealth reflects such features as satisfaction with promoting a sustainable environment and supporting a more cohesive community.

The model presented here is based on a choice between two assets:

- An asset with risk-free financial returns ( $r_f$ ); and
- A risky asset that carries both financial returns ( $r$ ), and social and environmental returns (SER).

The model starts at point  $t-1$ , in which the decision is to maximise the expected utility of invest what you have ( $w_{t-1} = 1$ ), in volumes of risk free asset  $q_{m\ t-1}$  and risky asset  $q_{a\ t-1}$  at  $t-1$  to receive back at time  $t$  the relevant rates of return relating to those assets, including social and environmental returns ( $SER_t$ ) that are proportional to the financial rates of return for the risky asset. Then the key variables to follow through on this model are:

- The returns to the risk free asset ( $i$ ), which is a constant;
- The financial returns to the risky asset ( $r_t$ ), equating to  $\beta_r + \varepsilon_{rt}$  where  $\varepsilon_r$  is distributed normally with mean 0 and positive variance  $\sigma^2_R$ ;
- The extent to which a unit of value of wider benefits for society is weighted by the investor compared to receiving a unit of financial value – expressed by a factor  $d$ ,

where  $0 \leq d \leq 1$ , so that a level of 0 represents no weight given to such benefits, while a value of 1 implies equal weighting with one's own financial assets;

- A proportional correlation,  $\alpha_{SER}$  between the value of financial assets and the wider social benefits associated with those assets;
- The degree of risk aversion,  $\delta$ , which is greater than 0.

The maximisation problem is then:

(1) Max  $E_{t-1} [U (ww_t)]$  through choice of  $q_{m\ t-1}$  and  $q_{a\ t-1}$  subject to a wealth constraint of no borrowing.

A simple utility function (2)  $U (ww_t) = E (ww_t) - \delta / (2 ww_{t-1}) * \text{Var} (ww_{t-1})$  is adopted, using the approximation suggested in Pratt (1964).

The solution (see equation 13, Annex 1) is to adopt a proportion of risky assets in accordance with (3)  $p_{a\ t-1} \bar{q}_{a\ t-1} / w_{t-1} = \{1 + \beta_r\} / \{\delta \sigma_R^2 [1 + d \alpha_{SER}]\} - (1 + i) / \{\delta \sigma_R^2 [1 + d \alpha_{SER}]^2\}$

#### *Implications for impact investors' choices*

Tables 1 and 2 below show the way that investors' choices vary with respect to trade-offs between (a) SER weighting factor  $d$ , and expected rate of return on the risky asset,  $\beta_r$  and (b) correlation in returns,  $\alpha_{SER}$ , and expected rate of return on the risky asset,  $\beta_r$ .

The tables show the relationship expressed in terms of which parameters keep the proportion of risk-free assets at points between 0% and 100%. In calculating the relationship, the following indicative values were used for variables:

- $\alpha_{SER}$  is assumed equal to 0.40, reflecting a clear but not extremely close correlation between financial and non-financial returns;
- The risk free interest rate is assumed equal to 0%;
- Delta is assumed equal to 0.115, from Bliss and Panigirtzoglou (2004); and
- Volatility in the rate of return of the risky asset is 0.064 (as per the variance in the FTSE small capitalisation index of monthly returns over the period 2003 to 2012).

Table 1 shows the required rate of return under different SER weighting factor assumptions.

Table 1 Rates of return – base case model

SER weighting factor	Required beta (risky assets = 0%)	Required beta (risky assets = 100%)
0%	0.00%	0.74%
5%	-1.96%	-1.21%
10%	-3.85%	-3.08%

In this model, a comparison of the figures in row 1 indicates that a premium of 0.74% is needed for the risky asset to overcome the drawbacks of risk aversion to volatility in returns.

## THE EFFECT OF SOCIAL VALUE MEASUREMENT ON IMPACT INVESTMENT DECISIONS

The comparison between the figures in row 3 and row 2, and also between row 2 and row 1, indicates the order of magnitude by which those who put a weighting on SER are prepared to accept a lower financial rate of return (this is a separate issue from whether in practice there *is* a lower financial rate of return from social investment, which is an ongoing debate that is beyond the remit of this paper).

Table 2 shows required rates of return for different correlation levels and 5% SER weighting.

Table 2 impact of different correlation levels in base case model

Alpha (SER) correlation factor	Required beta (risky assets = 0%)	Required beta (risky assets = 100%)
0%	0.00%	0.74%
40%	-1.96%	-1.21%
100%	-4.76%	-4.16%

The model implies that with no correlation to SER, the investor makes a decision based on financial return, regardless of their preferences for SER. It also indicates the extent to which those who put a weighting on SER are prepared to accept a lower financial rate of return as correlation rises between the financial return of the asset and SER.

### Inclusion of the ‘state of knowledge’ with respect to SER

In practice, there tends to be much uncertainty on the extent of correlation between  $SER_t$  and financial returns. This raises the question of the extent to which perceived social benefits should be discounted in the utility function, in the light of the uncertainty as to how ‘true’ they are. At least two possible routes can be identified, relating to information theory and evidence theory, which we consider in turn.

#### *Information theory model*

The first is to harness findings in information theory deriving from those set out in Weaver and Shannon (1963), reinterpreted for an investment setting in Chen (2007). Under this theory, the state of knowledge is improved when subjective views move closer to objective parameters, and is defined as:

(5)  $D(p \parallel q) = \sum_{j=1}^n p_j \log(p_j) - \sum_{j=1}^n p_j \log(q_j)$ , where  $(p_j)$  reflects objective parameters, and  $(q_j)$  reflects subjective views of those parameters. For our purposes, this index is translated into a discount factor, bounded between 0 and 1, using the simple equation:

(6)  $sk = \{\max(D) - D\} / \max(D)$ , where  $D$  is the state of knowledge coefficient, and  $\max(D)$  is the largest number that it could take in a plausible situation.

Simulating generic states for a given level of knowledge on the social and environmental returns of a project gives the results outlined in table 3 below.

Table 3 Levels of ‘state of knowledge’ where twenty levels of knowledge are possible

	<i>Probability correct</i>	<i>State of knowledge coefficient (D)</i>	<i>Discount factor (sk)</i>
Completely unclear	0.05	$3.00 = 1 * \ln(1) - 1 * \ln(1/20)$	0%
Initial thinking	0.33	$1.10 = 1 * \ln(1) - 1 * \ln(1/3)$	63%
Know if +ve or -ve	0.50	$0.69 = 1 * \ln(1) - 1 * \ln(1/2)$	77%
Strength of +ve or -ve	0.67	$0.41 = 1 * \ln(1) - 1 * \ln(2/3)$	86%
Detailed knowledge	0.80	$0.22 = 1 * \ln(1) - 1 * \ln(4/5)$	93%
Excellent knowledge	0.95	$0.05 = 1 * \ln(1) - \ln(19/20)$	98%

When the state of knowledge of the SER achieved is unclear, then the reported level of SER is fully discounted; when the state of knowledge of SER is excellent, the reported level of SER is not discounted.

This approach relies heavily upon individuals to be able to intuit their true state of knowledge effectively, and such a feature holds in fields as seemingly diverse as nursing (Gobet and Chassy, 2008), and chess (Saariluoma, 2001, for instance, notes that expert players rapidly draw on ‘thought models’ that are relevant to the position of the game, activated by recognition, but able to be combined into more complex structures). There is, however, ample scope for intuition to be wrong, both in terms of experts being over-confident in their knowledge when there has been a change in system; and for novices lacking confidence but still having significant insights. Unfortunately, however, the dynamic issues that this raises are beyond the scope of this paper.

#### *Scaling according to robustness of techniques for assessment*

The second approach is to use discount factors that relate the state of knowledge to the perceived robustness of the evidence available. UK civil service estimates of the optimism bias that should be applied to business cases (New Economy, 2013: 26) provide the following indicative factors.

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Table 4 Optimism bias correction factors for benefits by type of evidence

Evidence base for benefits	Age of data / analysis	Known data error	Optimism bias correction
Randomised Control Trial in UK	Current Data (<1 year old)	+/-2%	0%
International Randomised Control Trial	1-2 years old	+/-5%	-5%
Independent monitoring of outcomes with a robust evaluation plan	2-3 years old	+/-10%	-10%
Practitioner monitoring of outcomes with a robust evaluation plan	3-4 years old	+/-15%	-15%
Secondary evidence from a similar type of intervention	4-5 years old	+/-20%	-25%
Uncorroborated expert judgement	>5 years old	+/-25%	-40%

Source: New Economy (2013)

A comparison of tables 3 and 4 suggests a similar extent to which lack of knowledge leads to a discounting of value, and an implication of this is explored further in this paper.

## Model incorporating state of knowledge

Both of the above approaches suggest that the non-financial returns will tend to be discounted by an investor, not only in line with the weighting between financial and non-financial returns per se; and not only to the extent that non-financial returns happen proportionately to the financial returns; but also with respect to the extent to which the non-financial returns are viewed as credible.

We adopt an equation in which expenditure  $A_{t-1}$  on assessment supplements existing knowledge ( $sk_{t-1}$ ). This addition to knowledge process is scaled by the inclusion of a 'ratio of knowledge to cost' parameter  $\theta$ , in the following equation (7):  $sk_t = sk_{t-1}^{1 - \theta A(t-1) / w(t-1)}$  where  $sk_t$  is between 0 and 1. This equation takes on board the effect of the ability to improve knowledge becoming harder in a non-linear way as the starting point for knowledge is higher.

A revised model incorporating knowledge into decisions has the form (8):

$$\text{Max } E_{t-1} \{ p_{m \ t-1} q_{m \ t-1} (1 + i) + p_{a \ t-1} q_{a \ t-1} * [(1 + d \ sk_t \ \alpha_{SER}) (1 + \beta_r + \epsilon_{rt})] - \delta / 2w_{t-1} * [\text{Var} (w_{t-1})] \}$$

The Lagrangean function is (9):

$$p_{m \ t-1} q_{m \ t-1} (1 + i) + p_{a \ t-1} q_{a \ t-1} * [1 + d \ \alpha_{SER} * sk_{t-1}^{1 - \theta A(t-1) / w(t-1)}] (1 + \beta_r) - \delta / 2w_{t-1} * p_{a \ t-1}^2 q_{a \ t-1}^2 (1 + d \ \alpha_{SER})^2 \sigma_R^2 + \lambda * (w_{t-1} - p_{m \ t-1} q_{m \ t-1} - p_{a \ t-1} q_{a \ t-1} - A_{t-1})$$

It can be shown (see Annex 1) that the solution for  $p_{a \ t-1} q_{a \ t-1} / w_{t-1}$  becomes a variant of (3):

$$10) p_{a \ t-1} \bar{q}_{a \ t-1} / w_{t-1} = \{ (1 + \beta_r) [1 + d \ \alpha_{SER} * sk_{t-1}^{1 - \theta A(t-1) / w(t-1)}] - (1 + i) \} / (\delta \sigma_R^2 * (1 + d \ \alpha_{SER})^2).$$

### *Indicative parameters*

The additional parameters introduced in this section are  $sk_{t-1}$  and  $\theta$ . The value of  $sk_{t-1}$  is taken to be 0.333, reflecting basic initial thinking; and an estimate of  $\theta$  of 22 is the best fit for a curve of this form to fit the values of  $sk_{t-1}$  and assessment costs as a proportion of wealth shown below in figure 1.

Figure 1 Indicative relationship between state of knowledge and assessment costs, using information theory coefficients

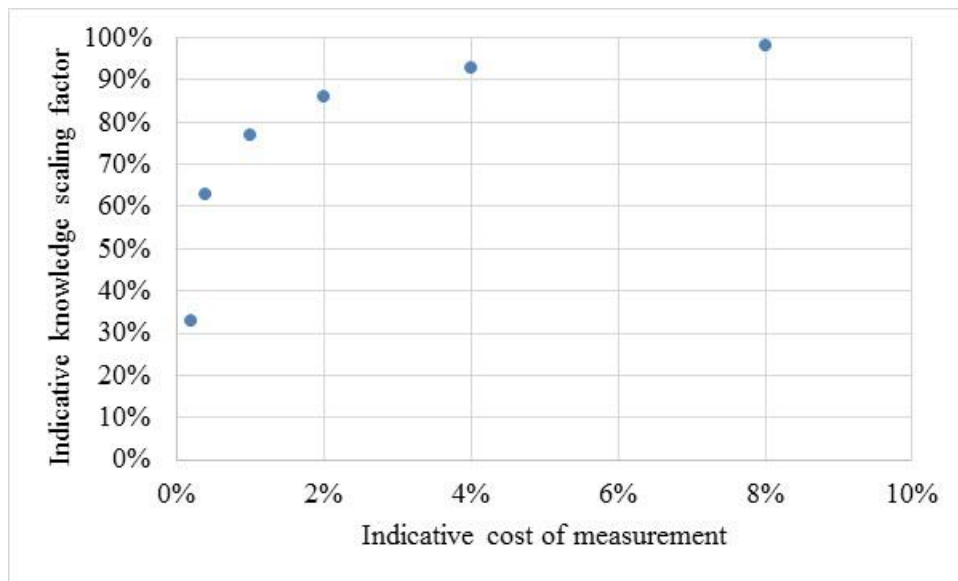


Table 5 shows shares of risky assets held under different rates of return under these parameters, and with an SER weighting of 5%. It also shows shares of assets held when the value of  $\theta$  is halved to 11, reflecting a more difficult route to increasing knowledge.

Table 5 Assets held given different rates of return and different parameters for acquiring knowledge

	Zero level of risky assets	Full level of risky assets
[I] Expected financial rate of return (without assessment effects)	-1.96%	-1.21%
[II] Expected financial rate of return (standard level of $\theta$ )	-1.06%	-0.32%
[III] Expected financial rate of return (level of $\theta$ is halved)	-0.84%	-0.09%
[IV] Share of wealth in risky assets	0%	98%
[V] Share of wealth in risk free assets	98%	0%
[VI] Allocation on measurement	2%	2%

## THE EFFECT OF SOCIAL VALUE MEASUREMENT ON IMPACT INVESTMENT DECISIONS

A comparison of rows I and II suggests that a higher rate of return is required (by an amount of the order of 0.9% per annum), when assessment effects are included – a significant level of change, given that the effect of risk aversion is to require a higher rate of return of the order of 0.7% per annum.

A comparison of the rows II and III also shows that more difficult measurement brings about a higher required financial rate of return (by an amount of the order of 0.2%). Hence, not only are some issues (such as the level of empowerment in a society) more difficult to measure, but also the level of SER demanded is higher when such intangibles are the subject of the programme.

### Discussion

The model provides a highly simplified perspective on the issue of financial returns, non-financial returns and the state of knowledge of those non-financial returns. Such an initial foray into the field leaves many obvious potential refinements (increasing the number of assets with different characteristics; a more sophisticated version of the growth of knowledge; an equilibrium model of prices for assets; an allowance for different discount factors for the ‘stock’ of SER compared to the future ‘flow’ of SER to name four major agendas), but does suggest several clear hypotheses for comparison against empirical analysis:

- Those who put a weighting on SER are in theory prepared to accept a lower financial rate of return that can be as much as of the order of 1 or 2 percentage points p.a.;
- The lack of clear knowledge on SER performance reduces the extent to which investors would be willing to reduce financial returns by a high fraction of that potential margin, and by a greater effect than risk aversion per se;
- When the SER returns relate to intangibles that are harder to measure, there is a further significant reduction in the extent to which investors are willing to reduce financial returns.

These hypotheses appear to be in line with what practitioners have found. However, much more work is needed to develop a more sophisticated analysis and to develop effective databases with which to test the extent, if any, to which the hypotheses hold in practice.

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## Annex Deriving key results

### Base case model without assessment effects

Wealth is allocated between a risk-free asset and a risky asset relating to socially beneficial activities:

$$A1) w_{t-1} - p_{m,t-1} q_{m,t-1} - p_{a,t-1} q_{a,t-1} = 0$$

$$A2) E_{t-1}[w_t] = p_{m,t-1} q_{m,t-1} * (1+i) + p_{a,t-1} q_{a,t-1} * E_{t-1}[1+r_t]$$

The wider benefits for society are additive but discounted by  $d$  (knowing that social benefits of £1 have been achieved is generally worth only a fraction of that to an individual), and the extent to which the risky assets correlate with social benefits. This suggests an expectation function of the following form:

$$A3) E[ww_t] = p_{m,t-1} q_{m,t-1} * (1+i) + p_{a,t-1} q_{a,t-1} * E_{t-1}\{1 + d * \% SER_t\} * (1+r_t)$$

We adopt a standard utility function that increases in  $w_t$ , and declines with  $\delta$  (the degree of risk aversion), multiplied by  $\sigma_w^2$  (the variance of wealth). For pure wealth effects the utility function is:

$$A4) U(q_{m,t-1}, q_{a,t-1}) = E[w_t] - \delta * Var(w_{t-1}) / (2 w_{t-1})$$

The assumptions in respect of returns are that:

$$A5) r_t = \beta_r + \varepsilon_{rt} \text{ where } \varepsilon_{rt} \text{ is distributed normally, mean 0, variance } \sigma_R^2$$

$$A6) SER_t \text{ as a proportion of the value of risky assets is given by the term } \alpha_{SER}$$

$$A7) cov(i, r_t) = 0, \text{ to exclude CAPM portfolio effects from the analysis.}$$

The investor aims to maximise the expected utility of wider wealth,  $E_{t-1}[U(ww_t)]$ , through choice of  $q_{m,t-1}$  and  $q_{a,t-1}$ . From A3 and A4, the problem can be expressed as:

$$A8) \text{Max } E_{t-1} p_{m,t-1} q_{m,t-1} (1+i) + p_{a,t-1} q_{a,t-1} * (1+d\alpha_{SER}) * E_{t-1}[(1+\beta_r+\varepsilon_{rt})] - \delta/(2w_{t-1}) * E_{t-1} Var(w_{t-1})$$

This can be simplified, for equilibrium choice ( $\bar{q}_{m,t-1}, \bar{q}_{a,t-1}$ ) as follows:

$$A9) Var(w_{t-1} | \bar{q}_{m,t-1}, \bar{q}_{a,t-1}) = Var([1+i] * p_{m,t-1} \bar{q}_{m,t-1}) + Var([1+r_t] * p_{a,t-1} \bar{q}_{a,t-1} * \{1+d\alpha_{SER}\}) + 2 Cov([1+i] * p_{m,t-1} \bar{q}_{m,t-1}, [1+r_t] * p_{a,t-1} \bar{q}_{a,t-1} * \{1+d\alpha_{SER}\})$$

$$\simeq Var(1+i) p_{m,t-1}^2 \bar{q}_{m,t-1}^2 + Var(1+\beta_r+\varepsilon_{rt}) p_{a,t-1}^2 \bar{q}_{a,t-1}^2 (1+d\alpha_{SER})^2 + 2 Cov((1+i)*\bar{q}_{m,t-1} p_{m,t-1}, (1+\beta_r+\varepsilon_{rt})*(1+d\alpha_{SER}) p_{a,t-1} \bar{q}_{a,t-1})$$

$$\text{since } (1+i) \text{ is fixed, and } Cov(i, \varepsilon_{rt}) = 0 \text{ from A7, } Var(w_{t-1}) \simeq \sigma_R^2 p_{a,t-1}^2 \bar{q}_{a,t-1}^2 (1+d\alpha_{SER})^2.$$

The maximisation problem then equates to:

$$A10) \text{Max } p_{m,t-1} q_{m,t-1} (1+i) + p_{a,t-1} q_{a,t-1} * [1+d\alpha_{SER}] * (1+\beta_r) - \delta/2w_{t-1} * p_{a,t-1}^2 q_{a,t-1}^2 \sigma_R^2 (1+d\alpha_{SER})^2.$$

The Lagrangian takes this function and adds constraint (A1).

Differentiating with respect to choice of  $q_{m,t-1}$  and  $q_{a,t-1}$  and setting equal to zero, we obtain:

$$A11) p_{m,t-1}(1+i) + \lambda(-p_{m,t-1}) = 0, \text{ which implies that } \lambda = (1+i),$$

$$A12) p_{a,t-1}(1+d\alpha_{SER})(1+\beta_r) - p_{a,t-1}^2 \bar{q}_{a,t-1} * \delta \sigma_R^2 (1+d\alpha_{SER})^2 / w_{t-1} - (1+i)p_{a,t-1} = 0 \text{ (note that the second derivative in } q_{a,t-1} \text{ is equal to } -p_{a,t-1}^2 \delta \sigma_R^2 (1+d\alpha_{SER})^2 / w_{t-1}, \text{ which is negative for } \delta > 0, \text{ hence this point represents a local maximum).}$$

Rearranging for share of wealth in risky assets,  $p_{a,t-1} \bar{q}_{a,t-1} / w_{t-1}$  we obtain:

$$A13) p_{a,t-1} \bar{q}_{a,t-1} / w_{t-1} = \{1+\beta_r\} / \{\delta \sigma_R^2 [1+d\alpha_{SER}]\} - (1+i) / \{\delta \sigma_R^2 [1+d\alpha_{SER}]^2\}$$

### *Model including assessment effects*

We assume that the investor weights social benefits by a ‘knowledge scaling factor’ drawing on reports on social benefits, with the investor gaining deeper insights from additional efforts placed on assessment. We model the knowledge scaling factor by  $sk_t$  (which varies between 0 and 1), and model assessment expenditure by  $A_t$ . The link between  $sk_t$ ,  $sk_{t-1}$  and  $A_{t-1}$  is given by A14):  $E[sk_t] = sk_{t-1}^{1-\theta A(t-1)/w(t-1)}$

The maximisation problem is therefore (A15):

$$\text{Max } E_{t-1} \{p_{m,t-1} q_{m,t-1} (1+i) + p_{a,t-1} q_{a,t-1} * [(1+d sk_t \alpha_{SER})(1+\beta_r+\epsilon_{rt})] - \delta / 2w_{t-1} * [\text{Var}(w_{t-1})]\}$$

$$\text{The Lagrangean is (A16): } p_{m,t-1} q_{m,t-1} (1+i) + p_{a,t-1} q_{a,t-1} * [1+d\alpha_{SER} * sk_{t-1}^{1-\theta A(t-1)/w(t-1)}] (1+\beta_r) - \delta / 2w_{t-1} * p_{a,t-1}^2 q_{a,t-1}^2 (1+d\alpha_{SER})^2 \sigma_R^2 + \lambda * (w_{t-1} - p_{m,t-1} q_{m,t-1} - p_{a,t-1} q_{a,t-1} - A_{t-1})$$

The associated first order conditions, differentiating with respect to  $q_{m,t-1}$  and  $q_{a,t-1}$  are:

$$A17) (1+i)p_{m,t-1} - \lambda p_{m,t-1} = 0, \text{ hence } \lambda = (1+i)$$

$$A18) p_{a,t-1}(1+\beta_r)[1+d\alpha_{SER} * sk_{t-1}^{1-\theta A(t-1)/w(t-1)}] - p_{a,t-1}^2 \bar{q}_{a,t-1} (1+d\alpha_{SER})^2 * \delta \sigma_R^2 / w_{t-1} - (1+i)p_{a,t-1} = 0$$

From (A18), and setting  $A_{t-1}/w_{t-1}$  to the value  $a$ , it follows that investment in risky assets is given by: A19)  $p_{a,t-1} \bar{q}_{a,t-1} / w_{t-1} = \{(1+\beta_r)[1+d\alpha_{SER} sk_{t-1}^{1-\theta a}] - (1+i)\} / (\delta \sigma_R^2 * (1+d\alpha_{SER})^2)$

In assessing this equation, values of  $a$  are estimated from observed levels of expenditure on assessment by impact investors.

# FINANCING OF PUBLIC NEEDS BY SELECTED PUBLIC BENEFIT FUND IN THE SLOVAK REPUBLIC AND IN THE REPUBLIC OF SERBIA

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**Abstract.** *The presented article deals with the very actual issue of financing of the public needs by public funds in Slovak Republic and the Republic of Serbia. The subject of public finances is connected to the explanation of strategic management importance in the public sector. The existence and the necessity of the public sector are currently indisputable. Many experts are dedicated for analyzing and defining the public sector because of its global effect*

**Keywords:** *Slovak Republic, the Republic of Serbia, public benefit funds, public sector*

**JEL Classifications:** *O38, F63, H41*

## Introduction

The article will focus on the definition of key terms and on the definition of earmarked funds as well as on the analysis of the current status and sources of funding in order to evaluate the sufficiency or insufficiency of financial resources, to identify its advantages and disadvantages. Thus, the article will be divided into four parts and will be elaborated within the analysis method and in addition by case study method. The first part of the article will focus on definition of general terms. The second part will tend to point out such issue via case study regarding the use of selected public benefit funds in Slovak Republic. In addition, the third part will present the analogical case study in the Republic of Serbia.

## Key terms definition

The main issue of the work is the financing of **public needs** by the selected public benefit funds. The general issue includes the public sector which represents the counterparty to the private sector. The public sector, however, by its activity, is able to affect the private sector mainly by decision-making process in the area of law creation by the State legislation. Based on the analysis of the available information the necessity of distinguishing between the private and public sectors has to be demonstrated and concluded.

## FINANCING OF PUBLIC NEEDS BY SELECTED PUBLIC BENEFIT FUND IN THE SLOVAK REPUBLIC AND IN THE REPUBLIC OF SERBIA

"**The public sector** in each country represents a significant part of the national economy. As we talk about national economy, we need to define entities that operate in the national economy. We can distinguish:

- **Profit organization.** The method of financing profit organizations is based on revenues received from the sale of goods and services. These are organizations focused primarily on creation of profit. Since they are financed by revenue, profit generation is a condition of their existence. Private ownership is the predominant type of property, although the State or municipal ownership may exist in this type of organizations. State or local government body sets up businesses as a result of ensuring public services (e.g. National defence, environmental protection) or in the areas that are not interesting for the private sector because they are capital intensive (e.g. State infrastructure building, building sewers).
- **Non-profit organizations.** The public or municipal ownership is the most common type of ownership. The aim of the establishment of such organizations is to provide services to population (e.g. health, educational, social). There is also private ownership of such organizations. Non-profit organizations are funded by:
  - Public finances - which serve to ensure the operation of public institutions and their interests. Finances originate from public money market funds.
  - Finances derived from specific natural or legal persons who provide them for the particular purpose. (Majduchova, H. 2009)

The existence of the public sector is the result of market failures. The public sector and the private sector show the demonstrative with symbiosis mutually beneficial coexistence in so called mixed economy. Both sectors, the public one and the private-one, which is profit-making sector, are mutually determinate and complement to each other." (Peková, J. – Pilný, J. 2002). The above mentioned authors point out to the cause of the origin of the public and the private sector. Public and private sector coexist and work together, failure or slowdown of another supports the development of the other. Therefore, if the private sector fails the public sector would develop.

Many authors refer to the inclusion of the public in the national economy as a separate sector. The authors as Mrs. Pekova and Mr. Pilny in their own definition draw attention to the failure of one sector resulting in the development of the other. However, Mr. Vilhelm points out to existence of institutions which establish and implement State measures in the market mechanism which on this way is important in fulfilling the functions of the public sector in the context with the shadow economy. (Vilhelm, D. 2013)

*"The public sector is financed through public funds and includes various institutions; from their legal forms imply different ways of financing. The public sector is managed and administered by public administration, decided on the public option and subject to public control. The public sector provides public goods and services through its activities, helps to create positive externalities or diminish the impact of negative externalities."* (Cibáková, V. et al. 2012)

**The public goods** are very tightly linked to the public sector since the public sector provides public goods and services. The public goods and services include such goods and services that are not economically efficient and therefore private organizations acting in the

private sector does not provide them. The public goods and services are provided from public funds. The issue of financial management becomes important in this moment since it is necessary to know the subject which will bear the costs when providing those public goods.

Financial management, financial planning and decision making process deal with questions such as "how should we proceed, for example, with the street lamp that lights up no matter how many people pass along and how many people have any benefit from such lighting? How do we provide to charge people for every streetlight in town?" (Beňová, E. at all. 2007) When deciding on the public finances use in the government charges how to standardize the amount of collected needed public revenues in order to provide public goods and services? This measure is related to the function of the allocation of public finance and public expenditure forms. As to the decisions in the area of the public sector financing encompass at least three levels. Within them, it is decided what to fund, which instrument will be used to achieve the aim, but the most important is to identify who will provide the public services.

Public finances are formed by the state budget, budgets of lower levels of government, and special purpose funds that are established by law. By the term "fund", we understand that part of the property which is designed exclusively for the purpose defined by using. *"When we talk about the targeted financing of public needs, we are referring to the use of cash funds that represent part of the public finances. The essence of the purpose financing is the expenditure restraint by income; that are purposefully designed to cover them."* (Beňová, E. at all. 2007) According to the publication Peková and Pilný, we include special-purpose state funds to the system of extra-budgetary funds, in which we can include also e.g. the health insurance funds, social security funds, and non-specific extra-budgetary funds of municipalities and higher territorial units, too. (Peková, J. – Pilný, J. 2002)

## **The financing public needs by public funds in Slovak Republic**

Slovak Republic became Member State of the European Union on 1 May 2004 and therefore the public sector is defined on the basis of the European System of Accounts "ESA 95". According to ESA 95, the national economy is formed by the following sectors: non-financial corporations, financial corporations, public administration, households, and non-profit institutions serving households.

The GFSM 2001 (Government Finance Statistics Manual 2001) classifies the public sector like the ESA 95. According to the GFSM 2001, two components constitute the public sector: public administration and public corporations. *"The public corporation is legally regulated association of persons for the purpose of tracking a particular objective. Public corporation is financed partly or wholly from public budgets. They follow public interest objectives, but also provide public services."* (Klimovský, D. 2014) There are many classifications of **public corporations**. They can be distinguished from the financial point of view, according to the founder, in terms of or under an organizational perspective. From the financial perspective, we distinguish the budget public corporations and contributory public corporation. Organizational aspect is also interesting because public corporation is divided into:

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- Financial-economic public corporation – e.g. National Bank of Slovakia;
- Control public corporation – e.g. The Supreme Audit Office;
- Cultural public corporation – e.g. Slovak National Museum, Slovak Matica;
- Educational public corporations and scientific-research public corporation – e.g. Slovak Academy of Sciences;
- Public purpose funds - we also include special-purpose funds in this type of public corporation, such as The Recycling Fund, The Environmental Fund, The State Housing Development Fund, The National Nuclear Fund for Decommissioning of nuclear installations and the management of spent of nuclear fuel and radioactive waste, so called. Nuclear Fund;
- Other public corporations – e.g. Mountain Rescue Service. (Klimovský, D. 2014)

The public needs are, in the context of Article financed through the public finance. Public finances are formed by the state budget, budgets of lower levels of government, as well as special-purpose government funds. Public purpose funds are established by law. State funds act as legal persons and are established by law; they are set up for financing designated tasks.

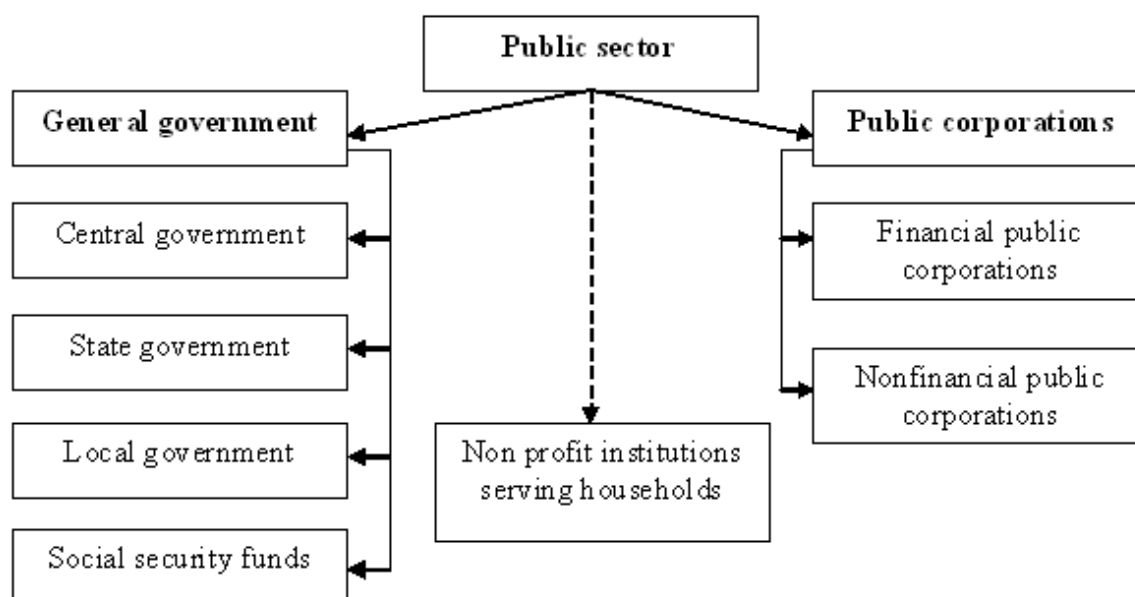


Figure - Public sector according to ESA 95 (Cibáková, V. et all. 2012)

As a result of the integration processes, as well as globalization, Slovak Republic has developed also another line of financing of public needs, which was in the form of transnational funds. In this type of financing by transnational funds; it can be based on the European Union Funds. Slovak Republic uses all types of multinational funds. These funds are divided into:

- Pre-accession called pre-structural funds – have been designated to the associated countries, i.e. countries preparing to join the European Union. Funds task was to simplify and facilitate the changes that were necessary to be carried out in those countries.

- Structural Funds - are used for the implementation of cohesion policy. The main role is the equalization of economic and social disparities between the regions of the European Union, the Member States and ensuring harmonious development of the whole area. Various initiatives operate with these funds.
- Cohesion Fund of the European Union – the aim is to support projects to help the environment, and transport infrastructure.

**Public enterprises** also constitute a component of public finances. It is often used to designate them as well as the notion public or state enterprises. This is a business established by the State for the production of public goods necessary for the inhabitants of the country. Public enterprise is an enterprise that produces public goods and providing public services for remuneration for private consumption. We can classify the public goods provided at the national level and financed from the state budget: the national defense, the higher education, the public health, and the social facilities of national importance. However, private called non-profit, non-governmental, and charitable organizations of third sector can provide the public goods, too. (Beňová, E. at all. 2007) Law No. 35/2002 regulates non-profit organizations providing generally beneficial services. "The law defines a nonprofit organization as a legal entity established under the Act, which provides welfare services for all users on equal terms. Community services are, for example:

- Provision of health care;
  - Provision of social assistance and humanitarian care;
  - Creation, development, protection, restoration and presentation of spiritual and cultural values;
  - Protection of Human Rights and Fundamental values;
  - Education, training and development of physical culture;
  - Research, development, scientific and technical services and information services;
  - Creation and protection of the environment and the protection of public health;
  - Services to support regional development and employment;
  - Providing housing, administration, maintenance and renewal of the housing stock.
- (Majdúchová; H. 2009)

Area of public services in Slovak Republic is defined by legislation, e.g. Act no. 461/2003 Coll. of social insurance, as amended; Act no. 448/2008 Coll. About social Services, as amended; Act no. 49/2002 Coll. about the protection of monuments, as amended; Act no. 61/2000 Coll. on educational activities, as amended; Act no. 460/1992 Coll. the Constitution of the Slovak Republic, as amended; but especially by Act no. 34/2002. Coll. on the Foundations and amending by the Civil Code, as amended. The Act on the Foundations defines **public service purposes**. "*Public benefit purpose shall mean the development and the protection of spiritual and cultural values, the realization and protection of human rights and other humanitarian objectives, the protection of environment, the preservation of natural values, health, protection of children and young people, the development of science, education, physical education and the performance of*

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*individual humanitarian aid for an individual or group of people who find themselves in danger of life or need urgent help after a natural disaster.”*

Purpose funds may be state or non-governmental. In the next section we will analyze the selected special-purpose funds operating in Slovak Republic.

**The Recycling Fund** is non-state, purpose-bound organization, which was established by July 1, 2001. One of the tasks is to support projects establishing and developing separate collection and recovery of waste. Another aim is to finance support of municipalities and their associations for waste separation and transfer for further appreciation. Support is performed in the form of grants and loans. The Recycling Fund was established by the Act on waste in 2001 and it became a new element in the system of waste disposal in the Slovak Republic. One of the aims of its establishment was material provision of ecological and economic treatment with designed products and materials after the end of life-span, following the principle “The polluter pays”. *“The establishment of the Recycling fund as a specialized organization, in which financial resources for the support of collection, appreciation and recycling of designed types of waste are concentrated, is in compliance with the practice of the European countries (Hungary, Austria, and Sweden). Those utilize the commodity directives of the European Union (e.g. directive no. 94/62/ES on waste, no 75/439/EHS on waste oils, no. 96/2002/ES on waste from electric and electronic devices, no. 91/157/EHS on batteries and accumulators), according to which, the costs on arrangement of collection and appreciation may be settled from the fees (charges) that are placed on products and materials, from which waste originates.”*

The Recycling Fund income resource consists of:

- Donations and contributions of national and foreign entities and natural persons,
- Incomes from agreed penalties,
- Rates coming from credits supplied by the Recycling fund,
- Incomes from return and withdraw of financial means of the Recycling fund, which were used in an unlawful way,
- Profits from the property of the Recycling fund,
- Rates from the financial means of the recycling fund kept in banks,
- Other resources if stipulated by the special law.

**Fund to support education** is also non-state fund, established as a legal entity by law. Non-state character is manifested, for example, by the creating the bodies of the fund, where the impact of the governing bodies is limited. The Fund was established to support the education by the Act No. 396/2012 Coll. on Fund to support education, as amended. The Fund was established as a legal successor to the Student Loan and Loan funds for beginning teachers. The main activity of the Fund is to provide loans to university students, to the education staff, to the professional school staff and to the students of the doctoral program in daily program of study. Fund to support education provides loans administration on earlier funds. In its activities, the Fund works closely with the Ministry of Education, Science, Research and Sport of Slovak Republic, Student Council for Higher Education, as well as with Slovak PhD. Students Association.

**The Environmental Fund** of Slovak Republic has been established as the state fund with the purpose to gather financial resources and use them for the support of the environment. The role of the Environmental Fund is:

- to monitor and to control resources of the Fund;
- to promote activities aimed at achieving the state environmental policy at national, regional and local level;
- to promote exploration, research and development focused on identifying and improving the environment;
- to adopt and evaluate applications for aid, to provide a record of submitted applications, to conclude an agreement on providing of support.

Its main income comes from the sale of emission allowances, penalties for polluters, charges for groundwater extraction and wastewater discharge to surface water or penalties for infringements of environmental protection. The Fund operates at national, regional and local level.

**The State Housing Development Fund** was established by the Law of the National Council of Slovak Republic no. 124/1996 Collection of Laws, which improved its position and created conditions for providing state support for housing development. With effect from 1.1.2014 is the current law of the National Council of Slovak Republic no. 150/2013 Collection of Law replaced Law no. 607/2003 Collection of Laws. The State Housing Development Fund is established as a legal entity and acts in legal relations on its behalf. Priorities of state housing policy, adopted by the Government of Slovak Republic, in expanding the housing stock are financed through appointed fund. The State Housing Development Fund is a financial institution and serves for the implementation of financial engineering Instruments; it is also the employer for employees performing work in the public interest and other labour relations conducted by the appointed fund.

## **The financing public needs by public funds in the Republic of Serbia**

The system of public benefit fund is regulated from 2010, in the Republic of Serbia, precisely from 23. November 2010 when the Parliament adopted the Law on Foundations and public benefit funds. (Act. no. 88/2010 Coll. on Foundations) By this time, there were several organizations and foundations devoted to community service. However, the controlled system be adopted only in 2010. Nowadays, there are many organizations dealing with public goods and services, they help in the area where the state can not. One of the most famous foundations is Foundation of Novak Djokovic, but there are other foundations named after famous athletes, such as Vladimir Divac (basketball) and other well-known personalities, not just from the sport.

On the other hand, we can observe and analyze large philanthropic activities of companies operating in the territory of the Republic of Serbia. As an, we can mention as an example **The Delta Fondacija**, which is one of the largest contributors to public benefit activities in The Republic of Serbia. Only to mitigate the effects of the floods, that hit Serbia in May 2010, Delta Fondacija contributed more than 800 000 EUR.

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Other known foundations are:

- **Telenor fondacija** (mobile operator) - founded in 2007. The Foundation aim is to create a "human telephone numbers" for SMS donors. These phone numbers are toll-free and thus maximize financial resources for money collection, for which they are intended. In addition, Telenor Fondacija also deals with the "classical" philanthropic activity.
- **Hemofarm fondacija** (Pharmaceutical Industry) - was founded in 1993, the Foundation supports a very diverse range of public benefit activities. It is interesting that this Fund supports only associations or institutions, because by using this method they can encourage more people than when supporting individuals.
- **Trag Fondacija** - Foundation for the specific support of civic associations. This year celebrated 15 years of existence while the public benefit activities subsidize more than 4.7 million EUR.

We can analyze many foreign foundations and funds which are supported by states or embassies in the Republic of Serbia. As an example, we can mention:

- **USAID** - very active agency for development in the Republic of Serbia which supports constantly welfare and public activities.
- **SlovakAID** - it is interesting that Slovak Republic is seen in the Republic of Serbia as the "friendliest" member countries of the European Union. One reason is due to the activities of SlovakAid in the Republic of Serbia. Although the focus of this organization is nowadays in other countries, the Republic of Serbia still feels Slovaks as a fraternal nation.
- **Japan Foundation** – represents one of the most active organizations in the Republic of Serbia. Over the past financial year, this Foundation has donated more than 800,000 EUR and moreover has supported education and science. The Foundation is also very famous for its scholarships for students.

Although state funds to support public benefit purposes exist in Serbia. They have a special arrangement separated from the budget and have sufficient authority to decide about the support. As an example, we can analyze:

- **National Development Fund** – the aims is to encourage the development of Serbian economy and encourage entrepreneurs that they support increased employment and GDP growth.
- **Regional Fund to support refugees** – the Fund supports refugee families from the period 1990 to 2000, when the former Yugoslavia were in two civil wars.
- **State Fund for the development of scientific and artistic youth** - Fund supports talented young scientists and artists, their development and education.

However, there are other state funds and organizations which are aimed at promoting public benefit activities, which are of great importance to the work of all public interests. There is no law that would define the operation of state public benefit funds.

With the new legislation from year 2010, the action of public benefit organizations was largely changed and was adapted to the needs and practice. The Act defines a foundation as a legal person without property and owners, which are based on the achievement of public benefit purpose that is not otherwise prohibited by law or constitution. It is also important to note that foundations are treated as non-profit and non-governmental organizations. The Foundation may be established by one or more legal or

physical entities, Serbians as well as foreigners. Law does not identify public benefit funds, either as private or as public legal subjects. All funds (non-state), under the new law, were changed to the foundation (SRB: fondacije) and nowadays state public benefit funds are unregulated and their activities are not clearly identified. (Act. no. 88/2010 Coll. on Foundations.)

From the financial perspective, foundations do not fall under the tax liabilities and do not pay taxes from collected funds that are donated to the foundation for public-welfare projects and work. The Act regulates the registration of foundations. Agency for Economic register is in charge of the records, it is essential that each foundation has been registered. We can observe and monitor in this register information on founders of this Foundation, authorities and other relevant information. (Serbian business Register agency.) Ministry of Culture manages the regulatory standards for the functioning of foundations. It also monitors the activities of the foundation, its direction and controls serving the aims and statutes Foundation.

Financial and economic crisis largely suspended public-welfare projects in Serbia. The economy just "started" after the great inflation and two civil wars, but the financial and economic crisis that hit the Serbian economy stopped the rapid expansion of economy. Nowadays, there are very few financial resources for public benefit activities. The private sector continues to focus on the rescue of their companies, so there are only a little scope for financing public benefit projects. State, on the other hand, is in a more inferior position. The crisis has completely destroyed the state budget and unresolved debts and problems of the past do not allow sufficiently funded public benefit activities. However, when in May 2014, the Republic of Serbia has been hit by a big flood and many people have been uprooted, the willingness to help was demonstrated in almost every citizen of the Republic of Serbia and at many companies.

The great impact had a big scandal on the popularity of foundations at which one of the Foundation embezzled funds for their own benefit. After this scandal public interest to participate in public welfare activities waned and people stopped contributing to the Foundation, or if more funds for non-profit public benefit activities. Such adverse circumstances lasted a long time, perhaps several years, and a big change in the thinking of the population occurred after the floods in May 2014.

## **Conclusion**

The issue of financing the public sector is still a current topic of much discussion. The topic of financing public needs is also discussed, particularly financing through public benefit funds. In this article, we partially analyzed the situation in two selected countries, the Slovak Republic and the Republic of Serbia. Slovak Republic, as a member state of the European Union, has the experience with financing needs and development through various funds, public benefit funds as well. The case of the Republic of Serbia is a slightly different, because the Republic of Serbia is not a member state of the European Union but the financing of public needs through public benefit fund is already regulated by legislation.

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# ENTREPRENEURIAL STRATEGIES FOR STARTING A BUSINESS

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**Abstract:** *In this paper we focus on how entrepreneurs should select the right strategies in starting their business. We propose that in selecting the strategy enterprises should pay attention to industry life cycle, or in what stage of development the industry where the enterprise is trying to enter is in the moment. Those if the industry is in the introduction stage, this means that majority of enterprises in this industry are in the introduction or growth phase. And that's why in this phase we recommend that enterprises can use the strategies proposed by existing literature. But if the industry where enterprises want to enter is in the growth or maturity stage this means that in these industry the majority of enterprises are in the maturity stage and some in the growth phase. This means that the new enterprises that want to enter in these industries (maturity) need to choose a strategy which will be different from the one of enterprises that is in the maturity phase, where their position in the market is very strong. So if the new businesses want to compete with businesses in the maturity stage they need to select different strategy, if they chose to compete in the same strategy they most probably might lose, since they are competing with somebody which has big market and very powerful financial position. The result showed that differentiation strategy and niche strategy proved to be the most successful strategies for these enterprises compared to hybrid or cost strategy.*

**Keywords:** *strategy, industry life cycle, enterprise life cycle, quality, competitive advantage.*

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### INTRODUCTION

Enterprises are a living organism, and we need to remember this all the time. Enterprises go through different phases during their lifetime, starting from the initial (introduction) phase, the growth phase followed by maturity phase and the final phase decline. Hence it becomes quite clear that in various stages of enterprise development, requirements and benefits are different. Businesses need to realize that phases become different as the enterprise develops. One of the questions that is still unanswered, is why some businesses fail to exist in the initial phase and why do some succeed. The research conducted by Stapford and Baden-Fuller (1990) showed that almost all enterprises (that have been part of the research) invested in new equipment and organizational change. But, after some months, only some of them managed to survive. The reasons for failure varied for different situations, but most of all, it was as a result of failure to adapt and continuously innovate the enterprise strategy (Rexhepi, 2014). This research is related to finding proper strategies that will suit not only internal, but also external needs.

### CHARACTERISTICS OF THE GROWTH PHASE

It is important to emphasise that not all enterprises will be able to pass the first phase of the life cycle some businesses can stay at initial stage for a long time and then go straight to the decline stage. Most of the enterprises usually fail to pass the first phase in the first year. Statistics showed that only one of three enterprises will be able to move into the next phase of the enterprise life cycle (Rexhepi, 2014).

Characteristic of enterprises in the initial stage of the establishment of the enterprises is the small number of consumers who use their products or services. This phase is characterized by a small number of employees who have almost no power in the decision making. At this stage, the owner is everything for the enterprise; he brings all the most important decisions for the enterprise including the future directions of movement. The strategy of the enterprise is most commonly found in the head of the owner who often moves without any idea and in inconsistent way (Churchill and Lewis 1983, p. 34). The planning that occurs in this phase is related mainly with the planning of cash and some strategy, which further means identifying the enterprise with that strategy. The initial phase of development of enterprises among others has the following features:

- Low sales volume,
- High costs of financing the building of the enterprise,
- Revenue are low but growing,
- There is no consensus on the type of technology,
- Lack of experience,
- Problems in the supply of raw materials,
- Lack of research and development,
- Huge problems in finding funds, and so on.

Neil C. Churchill and Virginia L. Lewis have a slight different way of dividing the enterprise lifecycle or share of slightly different way i.e. they divide the initial phase into two phases' *existence and survival*. In the existence phase there are some main issues that need to be answered (Churchill and Lewis 1983, p. 32):

- Can you get enough customers?
- Can we deliver our products and do we have the needed raw materials?
- Can we extend the concept of pilot production to wider distribution network?
- Do you have enough cash to cover all requirements of this stage?

According to research the meaning or attention that needs to be given to these factors vary as the enterprise goes through the various stages of its development. So the ability of manager to do business and manage their cash in the first phase is very significant compared with other stages (Churchill and Lewis 1983).

## STRATEGIES FOR THE INTRODUCTION STAGE

There are several business strategies that enterprises can use when they compete in the market. As main alternative group of strategies are growth strategies, stability strategies, and generic strategies that are proposed for new enterprises in the initial phase. Growth strategies are classified into two basic categories, concentration on existing business or industry and diversification into other businesses or industries. Concentration strategy is used primarily in cases where the enterprise operates in an attractive industry with good growth potential. Diversification strategy is used in opposite situation where the enterprises operate in unattractive industries. Concentration strategy further can appear in the following two types:

- *Vertical integration* - is used in cases when the enterprise has a strong competitive position in a growing industry.
- *Horizontal integration* - involves expansion of the current product into other market segments or increasing of the volume of products in the existing market, or a combination of both.
- 

Also there are several *diversified growth strategies*, including:

- *Related diversified strategies (concentrated)* - involves the expansion of the activity of enterprises in related industries that are in synergy with existing lines of businesses.
- *Unrelated diversified strategies (conglomerate)* - includes entry into new businesses that are not related to existing business lines.
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Furthermore, enterprises can exploit the benefits of generic strategies (cost leadership, differentiation and focus on cost leadership or differentiation). These are the main strategies that usually enterprises in the initial phase can use. Once more, enterprises also need to understand that *choosing the right strategies for given situations in the right moment* is the best competitive

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advantage that an enterprise can invent. Most enterprises, when shaping their strategy, are usually oriented towards strategies of other successful enterprises. But, it is unlikely that a strategy which is successful in one enterprise will be successful in another enterprise, if we take into the consideration the uniqueness of each enterprise.

### DECIDING ON THE STRATEGY

The point of strategy is to offer to the enterprises a sustainable competitive advantage and this can be done only if the enterprise has a strategy which is original, compared to other enterprises and a strategy which is coordinated with all enterprise activities and emerges through time (Rexhepi, 2013). Enterprises need to adapt their strategies depending on the stage of development of the industry and the enterprise lifecycle. In every industry enterprises that compete among themselves are at different level of development some are new, some are in the growth, mature or declining stages even though the industry might be on maturity stage.

	Introduction	Growth	Shake	Maturity	Decline
Competitive condition	Some competitors	Entrance of competitors Fight for market share, There are no differentiation products/services	There are some competitors, Reduction of the prices by using economy of scale, Troubles for small and weak competitors	Fight for holding the market share, Difficulties in getting new market shares, Efficiency and low costs.	Some competitors are going out, Selective distribution.

*Figure 1 Competitive condition through different stages of development of the enterprises*

*Source: According to Johnson et al., 2005, p.86*

If we analyze figure one, we can see that competitive conditions are not the same among enterprises depending on their industry life cycle. This is why in this research we propose different strategies for every stage of development. As part of selecting the strategy for enterprises in the initial phase entrepreneurs need start thinking about some very important activities at the beginning, those are:

- Valuation of personal reasons for entering into business
- Deciding what type of business to enter and determination of the legal structure of the business,
- Taking the necessary permits and market research,
- Ensuring the necessary finance for business,
- Creating a business plan and strategy planning for business growth,
- Finding an accountant and attorney,
- Opening bank account and business planning etc..

Except previous activities entrepreneurs need to think about some other several *strategic issues* that enterprises should consider in the initial phase, as follows (Fowler et al., 2008, p.556):

- **Production** - capacity building that will increase the volume of products and improve the ability of the enterprise to be able to handle the increase in sales volume.
- **Financial Operations** - negative cash flow, limited access to loans, a small amount of production, efficiency of production.
- **Marketing** - enterprises need to invest in marketing in order to be able to build a recognizable brand. They should have enough information about their customers, not sell in small quantities, to perform segmentation in the market, to offer a test using the products, use of personal selling etc..
- **Human resources** - attracting competent employees, employee training, etc..
- **Research and development** - developing original capabilities that would have been leaders in the development. Businesses need to improve the product design process, have more patents etc.

Most of the mentioned activities and strategic issues will be solved if the new enterprises have its own business plan. It is very important for new entrepreneurs to understand that the role of the *business plan* is extraordinarily important in the initial stage. Planning activities in the initial stage is very hard work, resulting from insufficient information and high uncertainty that enterprises have at this stage. Making proper decisions at this stage is very important and depends primarily on the level of prediction of the circumstances described in the business plan. According to some research it was concluded that enterprises that have a formal business plan showed better financial performance than enterprises that did not own (Olson and Bokor, 1995). But even so still most of the enterprises in the initial phase fail to have a business plan. In a study conducted by Sage 44% of the analyzed enterprises said they would like more time to create or update their plans, 30% said they were too busy to be able to create appropriate business plans. This means that from all small and medium enterprises only 26% of these businesses had time to plan or carry out planning their business strategies (A Sage CRM, 2006 p.4). Another research

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undertaken by Philip D.Olson and Donald W.Bokor shows that only 19% of enterprises use a complete business plan or 31% have incomplete business plan, while 50% of enterprises do not use any planning. Very similar results we can find on the research undertaken by Shuman, Shaw and Sussman (Olson and Bokor, 1995).

The next strategy issue that enterprises need to undertake when entering new business is to use proper strategies in order to attract new consumers, *to use or try out their products*. These are some strategies or strategic issues that should be taken into account when the product is first launched. As most common strategies for attracting consumers are (A Sage CRM 2006 p. 5):

- Policy of free product return by consumers and providing guarantees for their products,
- Attractive payment conditions,
- Connecting products or services,
- Free training and strong educational programs related to sales capabilities,
- Advertising, and
- Promoting sales or prices.

Another very important strategy that could be used in this phase is benchmarking which means use of best practices from other enterprises, enhance that practice and adopt it to the enterprise condition. Benchmarking can help enterprises at this stage, because they have a lack of information or knowledge how to survive at this stage and how to compete. Most of the enterprises fail to cross the introduction phase, or even if they do that they exceed at the growth stage unprepared. In a survey conducted by Sage 53% of the analyzed small and medium enterprises in the introduction stage have no plan for moving to the stage of growth (A Sage CRM 2006).

As another successful strategy by which enterprises could revive their idea and lead the enterprise in the growth phase is concluding *alliances* with other enterprises. As the most common reason why enterprises in the initial stage should enter into alliances according to research made by Yong-Sik Hwang and Seung Ho Park (2007) is to avoid the high mortality rate that enterprises at this stage face. They also found that the formation of these alliances will evolve over time with learning, and re-adaptation.

In terms of generic strategies in this stage we recommend differentiation strategies and niche strategy (cost leadership) but not the pure cost leadership strategy. This because of the lack of experience and little bargaining power that the new enterprise has which influence having higher operation costs. Having in consideration all of the previous as strategic option that enterprises need to think of in the initial stage of development of the enterprises, are:

- Formulation of business plan,
- Aggressive marketing strategy to attract consumers,
- Use differentiation strategy or niche strategy,
- Take the advantage market leader (if the industry is in the early stages),
- Use of outsourcing and benchmarking,
- Use innovation strategy (if the industry is in the early stages),
- Use the best technology, pay attention to the quality and performance , develop attractive products with timely delivery of product with 100% quality,
- Raise capital ( cash),

A positive aspect when we are analyzing strategies for enterprises in the initial stage of enterprise life cycle is that we can use some of the strategies proposed for the product development, when they are in the initial stage. It is assumed that enterprises that are in the initial stages they also offer new product or services in the market. That's why David R Rink and Harold W Fox proposed selecting also adequate strategy for purchase, like: working with vendors to correct the defects of the products, monitoring reports on sales, creating a list of preferred vendors, preparing to deal with a lot of engineering changes, consolidating small orders and developing quality standards and costs (Rink & Fox, 2004, p. 87).

## RESEARCH METHODOLOGY

Beside the theoretical analysis presented within this research, we have also conducted an empirical research which was carried out in several ways, starting with a personal interview with the general managers of several enterprises, further questionnaire was sent by mail and finally we used e-mailing. Direct interview was conducted in total with 35 enterprises, by post were sent 40 questionnaires out of which only 15 returned the questionnaires. Via e-mail 200 questionnaires were sent, out of which 42 were returned, resulting in a total of 92 enterprises surveyed. This showed that the direct interview and the use of the mail is still the best way of communicating with the enterprises in the Republic of Macedonia, and the use of electronic mail proved to be quite inefficient. The survey was conducted in the period from 15 Feb to 15 April 2014. Data from the questionnaire were processed using the statistical program Statistical Package for the Social Sciences (SPSS).

## RESEARCH RESULTS

Research showed that the most frequent strategy used by enterprises in introduction phase is differentiation strategy, where 45% of the analyzed enterprises said that they use this strategy (**Figure 2**). The pure strategy on cost leadership has been used only in 12 % of the cases, Niche strategy is used on 25% of analyzed enterprises and hybrid strategy in 15% of cases. Using crosstabs we achieved also this result: 85% of analyzed enterprises which used differentiation strategy were successful in the past three years (2010-2013), 53% were successful when enterprises used niche strategy, 35% were successful when enterprises used hybrid strategy and 28% were successful when enterprises used pure cost leadership strategy. This leads us to the conclusion that differentiation strategy and niche strategy are the most successful strategies for enterprises in the initial phase.

## ENTREPRENEURIAL STRATEGIES FOR STARTING A BUSINESS

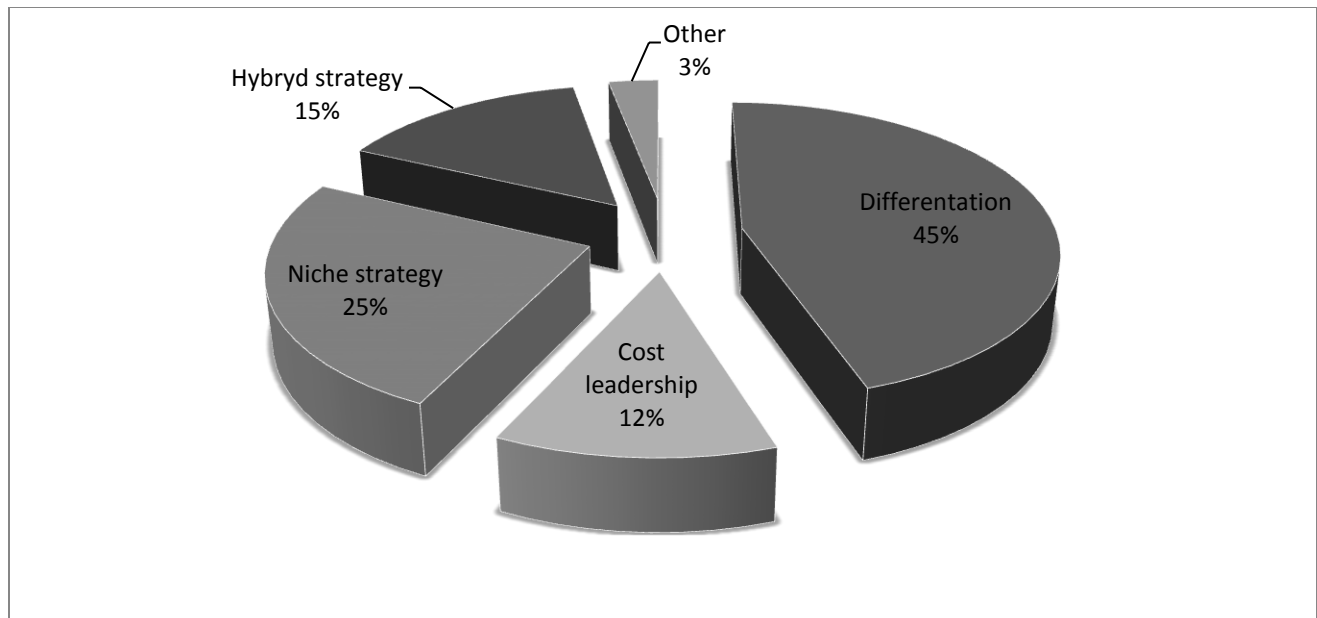


Figure 2. Strategy selection  
Source: Own research

Another research question that we analyzed is whether the strategy of the enterprises in the initial phase emerges or it is deliberate and does not change over time. Empirical research has shown that 8% of enterprises had committed a complete change of the strategy, 21% of enterprises had made major changes rarely, the other 31% of the enterprises had made small changes frequently, while 36% of enterprises had made minor changes rarely, and only 4% enterprise had never made any change in their strategy (**Figure 3**). According to the research result we can conclude that strategies in the initial phase emerge which isn't a case in other enterprise life cycle stages where there are only some minimal changes.

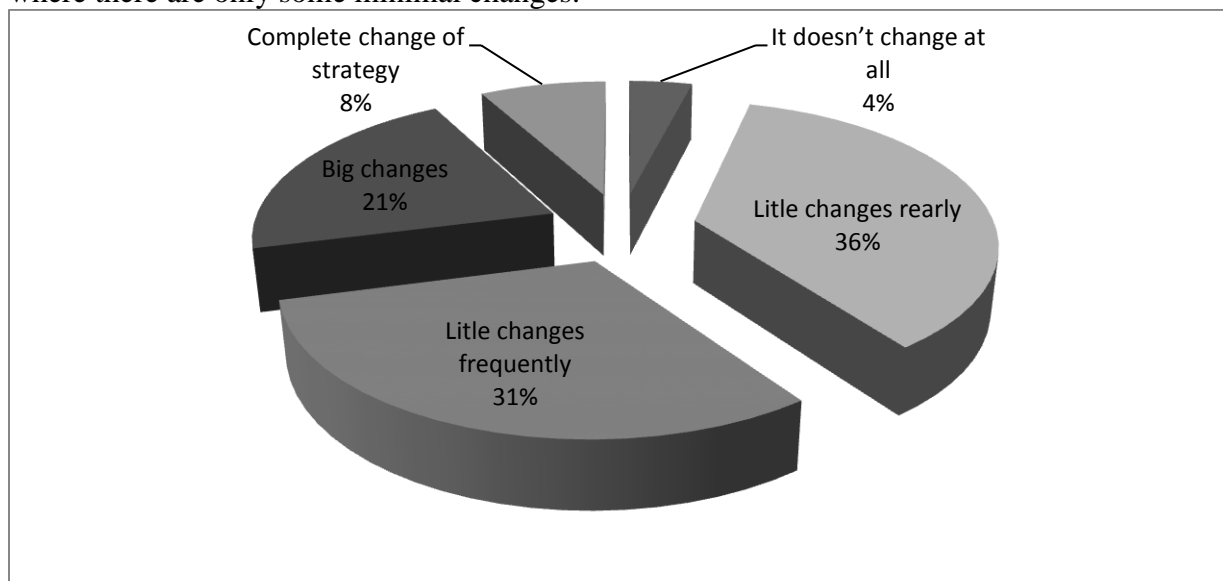


Figure 3 Degree of change of the strategy  
Source: Own research

The research also included the question - what is more important in establishing strategy in the initial phase, industry life cycle or enterprise life cycle? The survey showed that 72% of enterprises responded that the phase of development in which the enterprise is located has a great and profound impact on the choice of strategy, while only 28% of enterprises believe that it has no or little effect (Figure 4).

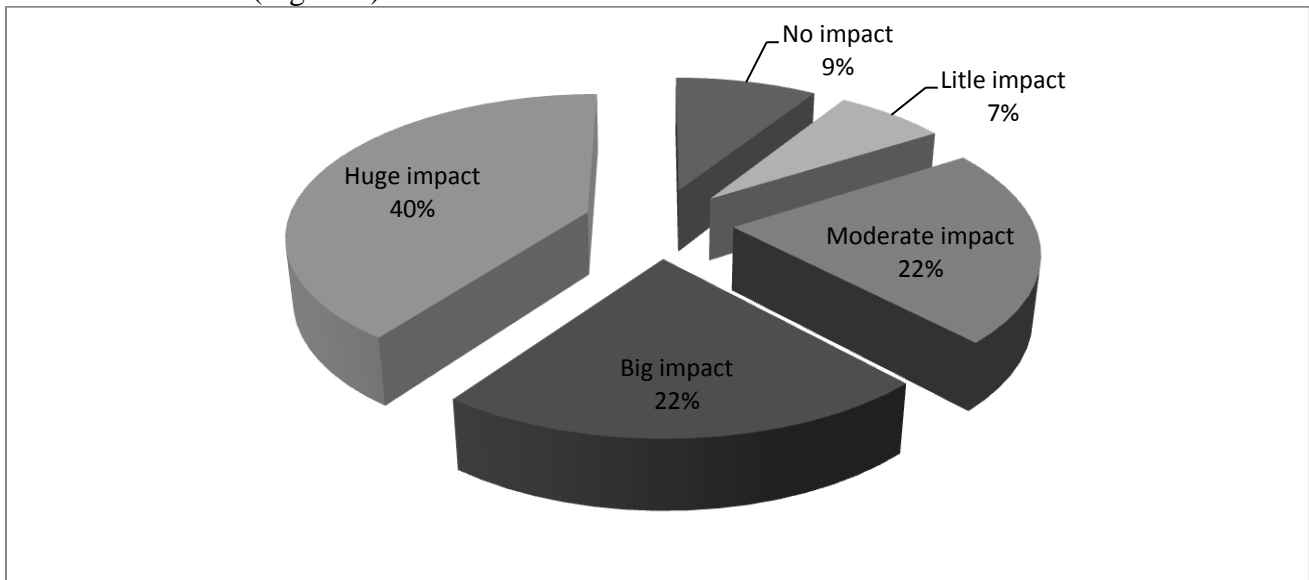
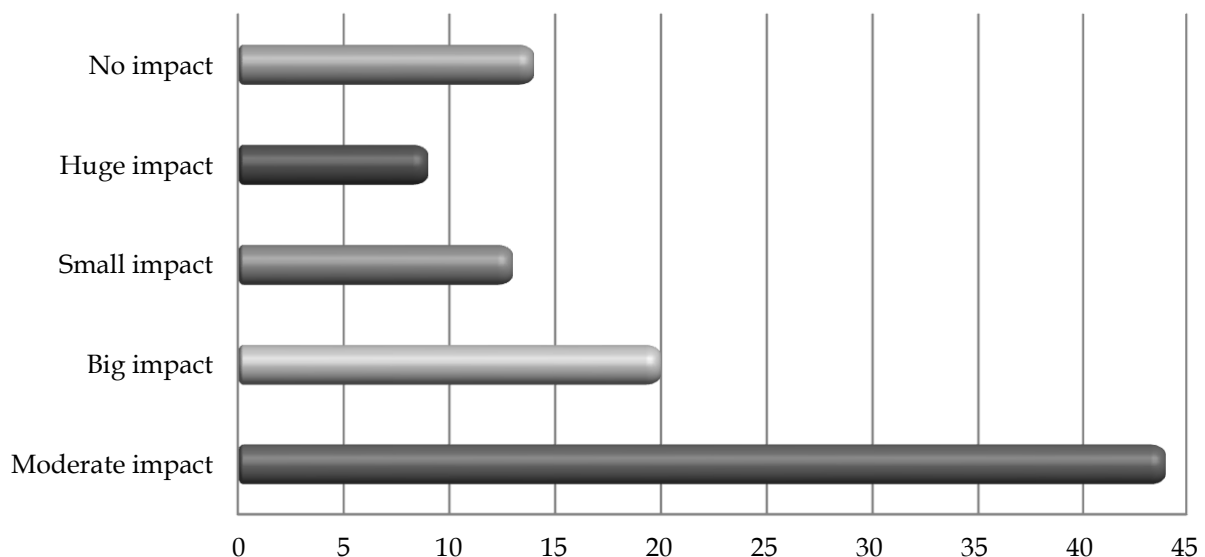


Figure 4 Influence of enterprises life cycle  
Source: Rexhepi, 2014, p.27

On the other hand, only 43% of enterprises believe that the phase of development of their industry has big or huge influence in formulating strategies, while 29% of the enterprises responded that the phase of industry development has little or no impact in their strategies, as presented in **Figure 5**.

**Figure 5.** Impact of industry life cycle  
Source: Rexhepi, 2014, p.27



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The results showed that the impact of both life cycles is very important, but the enterprise life cycle is more important than the industry life cycle in selecting enterprise strategy. These results also proved that industry life cycle still is most important than in other phase of enterprise lifecycle.

### CONCLUSION

It is very important that these enterprises ensure that products or services that are offered to retain the quality, and if possible improve. At this phase, the formulation of strategic directions toward which the enterprise will be moving in the future in order to become recognized by their customers takes place. In this regard, this is the phase when the enterprise should decide whether it will expand or stay at the current market position.

According to the survey conducted among 92 enterprises which are in the initial phase, 85% of analyzed enterprises which used differentiation strategy were successful in the past three years (2010-2013), 53% were successful when enterprises used niche strategy, 35% when enterprises used hybrid strategy and 28% when enterprises used pure cost leadership strategy. This leads us to the conclusion that differentiation strategy and niche strategy are the most successful strategies for enterprises in the initial phase according to the result that we gathered from analyzing the enterprises in Macedonia.

Strategies of enterprises in the initial phase should definitely be planned, but it is necessary to allow these strategies to change, upgrade or evolve over time. Empirical research has shown interesting results and that only 4% of enterprises committed complete change in their original strategy. Most frequently or rarely in 67% of cases enterprises, have committed minor changes to their original strategies, while only 21% of the enterprises made major changes in their strategies and big changes 8%; although this does not mean that they have completely changed their original deliberated strategies. This leads us to the conclusion that strategies in the initial stage emerge much more than in other enterprise life cycle.

When selecting the enterprise strategy, the impact of the enterprise life cycle and industry life cycle of the industry is quite significant, but the enterprise life cycle is more important than the industry life cycle. The results showed that 62% of surveyed enterprises believe that the enterprise life cycle has more impact in the formulating the strategy, while only 27% of surveyed enterprises believe that the impact of industry life cycle has a great influence in the formulation of strategy.

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# **SOCIAL MEDIA FOR THE BENEFIT OF COMPANIES, INVESTORS AND STOCK PRICE INFORMATIVENESS**

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**Abstract.** *Nowadays social networks play a crucial rule in a company's relationship with investors, requiring a stronger emphasis and more effort on the development of social media channels. We discuss a definition, classification and comparison for social media types. Then we consider the importance of social media for a company and investors, and provide evidence that social media use by firm can improve its stock price informativeness. A unique dataset was collected for an international analysis. Finally, an implementation plan is suggested for firms to maintain and manage social media.*

**Keywords:** *social media, stock price informativeness, investor relations, Twitter, Facebook, Youtube.*

**JEL Classification:** *M30, G17.*

## **Introduction**

Today, more than 1.8 billion people are present on social media websites<sup>1</sup>. Gathering, analysing and using online user-data has become one of the most thrilling but also most controversial domains in business (Busby et al., 2012).

The growing importance of social media has attracted various scholars, researchers and financial analysts, who want to increase their understanding of the effects of social media on stock price.

Among companies, there is an increasing trend of awareness that they can use these opinions, statuses, links etc. to better serve customers and investors. Moreover, companies get 24% higher revenue when they systematically control and manage their social media activities (Hinchcliffe and Kim, 2012).

Social media creates opportunities for conversations between companies and shareholders. The most important one is that they help investors to form a community around niche topics of interest. They use online sources to discuss stocks, bonds and other financial products. These investors seek advice, discuss ideas, state opinions and even guide other investors.

More than half of all financial bloggers use Twitter as a news source and also StockTwits to follow others sharing “investment intelligence” and opinions about companies. 49% of investors

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<sup>1</sup> Relevant data from statistics portal Statista.com <http://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/>

## SOCIAL MEDIA FOR THE BENEFIT OF COMPANIES, INVESTORS AND STOCK PRICE INFORMATIVENESS

read financial blogs and 27% of professional investors use YouTube according to Rivel Research, September 2010, as mentioned in Joyce (2013).

According to The National Investor Relations Institute's recent survey results agree: 52% of institutional investors use social media as part of their research process and "the vast majority of these respondents indicates that it has influenced their investment decisions at least occasionally" (NIRI, 2013).

Thus, with the increased usage of social media, companies should probably announce key investor-oriented information through social media, communicate and attract investors to follow a company via social media.

The rest of the paper is organized as follows. Section 2 provides an overview of social media classification and comparison. Section 3 discusses the relation between social media use by a firm and its stock price informativeness. Section 4 discusses the data and methods applied. Section 5 provides guidance to implement social media techniques in practice. The final section concludes.

### **Social Media Today**

Web 2.0 has completely changed internet usage and the daily habits of its users. Whereas in the past the internet was used only for sending emails and checking news pages, current visitors combine a whole range of activities including watching videos, booking a hotel room, sharing knowledge, writing a reference on a product and in the meanwhile keep friends 'posted' on what's currently happening. Web 2.0 created a framework for these social media, which is a keystone for today's connected society.

Social media give people a means to interact with each other. The main difference between social media and the original media such as newspapers, television and radio, is that the conversation is occurring in multi-faceted dialogue instead of a one-way monologue in the first case. Over 20% of the world population is joined. It is impossible to neglect the fact that social media have crucially affected the society. In order to give more direction to what we are going to discuss in our paper, we would like to present some definitions of social media.

Kaplan and Haenlein (2010) describe social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and allow the creation and exchange of user-generated content". According to Mangold and Faulds (2009), social media contains "a wide range of online word-of-mouth forums including blogs, company sponsored discussion boards, consumer-to-consumer e-mail, consumer product or service ratings websites, Internet discussion boards and social networking sites". Piller et al. (2012) illustrate social media as "a highly interactive platforms via which individuals and communities share, co-create, discuss, and modify user-generated content".

#### *Social Media Segmentation*

As there is an abundant number of social media websites, we included popular ways of segmentation analysis to organize this abundant offer of tools. Kaplan and Haenlein (2010) present the most cited method of classification. Social media are divided into six different segments as table 1 shows: blogs; collaborative projects; content communities; social networking sites; virtual social worlds; virtual game worlds.

Table 1. Segmentation matrix for social media types (Kaplan and Haenlein, 2010)

		Social presence/ Media richness		
		Low	Medium	High
Self-presentation/ Self-disclosure	High	Blogs	Social networking sites (e.g., Facebook)	Virtual social worlds (e.g., Second Life)
	Low	Collaborative projects (e.g., Wikipedia)	Content communities (e.g., YouTube)	Virtual game worlds (e.g., World of Warcraft)

Mayfield (2008) also uses six blocks for describing the nature of social media: blogs; social networks; wikis; forums; podcasts; micro blogging; content communities.

Kietzmann et al. (2011) emphasize the importance of a connection between social media and a company's strategy. The authors recognize the power of social media and underline that managers should pay attention to smart and creative users. Furthermore they prove Haenlein and Kaplan's idea about a lack between "what social media are, and the various forms they can take" by creating the honeycomb framework. The authors seek advice from professional bloggers to build seven social media blocks that can help to understand both the environment of social media and customers with their needs. In Figure 1 there are seven social media blocks, which are identity, conversation, sharing, presence, relationships, reputation and groups, and their implementation for companies.

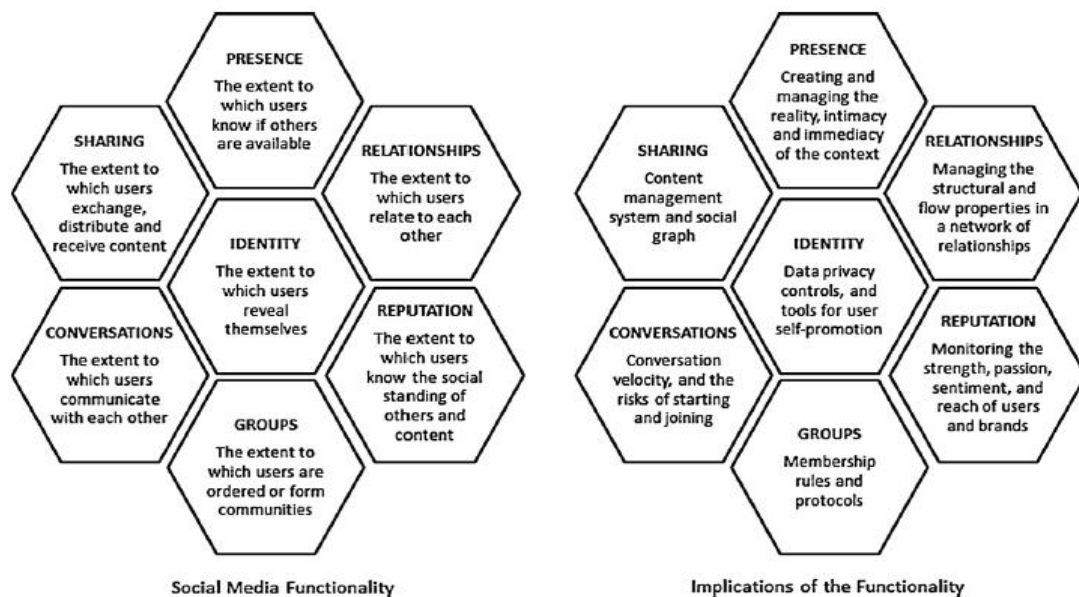


Figure 1. The honeycomb of social media (Kietzmann et al., 2011)

## SOCIAL MEDIA FOR THE BENEFIT OF COMPANIES, INVESTORS AND STOCK PRICE INFORMATIVENESS

Due to the huge offer of social media, unifying and creating an overview is a good tool for shaping clarity in the mass. All three above-mentioned types of segmentation are valuable and even necessary for companies in order to define which social media website(s) (or type) is the most appealing and useful to reach the companies' aims.

### *Social Media Overview*

The number of social media is growing very fast, day after day. Because of this, it is very difficult to outline a complete and up-to-date overview of the social media landscape.

Nevertheless, we included a short overview of the most popular and relevant social media for investor relations, such as Facebook, LinkedIn, Twitter, YouTube and SlideShare.

Facebook is currently the most popular social network in the world. The website commenced in 2004 as a Harvard university network which was spread from a school to broad-spectrum community to help people all over the world to connect and stay in touch.

LinkedIn is a professional networking site which was created in 2002 by Reid Hoffman and serves as the leading hub for connecting business contacts, searching for jobs and find potential clients. The website gives members the ability to create their own professional profile. More than 2 million companies all over the world use LinkedIn as a business tool for looking for people and useful information.

Twitter is a social network, where users share their thoughts. The website was created by Biz Stone, Evan Williams and Jack Dorsey in March 2006 and combines messaging and social networking while focusing on micro blogging which makes Twitter the leading provider of real-time information.

YouTube is the most popular platform for hosting videos and was created in 2005 by Jawed Karim, Steve Chen and Chad Hurley. YouTube also makes a profit of 6 billion from video views per month globally through top advertisers running their campaigns on YouTube. The YouTube player is available across tens of millions of websites.

SlideShare represents the world's largest professional and educational community where users can upload, share, comment and find presentations. Moreover, users can share ideas and research, connect with others, and companies can generate leads for their businesses. According to the official website, SlideShare is the market leader in sharing presentations.

Table 2 briefly summarizes the key characteristics and key differentiators of these social media.

Table 2. Key characteristics and differentiators between the named social media (author composition)

	<b>Facebook</b>	<b>SlideShare</b>	<b>YouTube</b>	<b>LinkedIn</b>	<b>Twitter</b>
Focus	Social network	Content community	Content community	Professional network	Micro-blogging
Monthly active users (in millions)	1,2802	603	1,000	300	255
% Growth of users (2 years)	34%	N/D	20%	71%	69%
Average time spent (min) / day	29:28	3:16	18:60	7:29	9:134
Annual Revenue 2013 (in million U.S dollars)	7,872	N/D	3,5005	473	2506
Number of employees	6,337	N/D	N/D	10,0007	2,7008
	<b>Facebook</b>	<b>SlideShare</b>	<b>YouTube</b>	<b>LinkedIn</b>	<b>Twitter</b>
Year of foundation	2004	2006	2005	2002	2006
Competitors	Google+, Hyves, Netlog, V Kontakte, Ozon, Orkut	Scribd.com, Issuu, Docstoc	Hulu, Dailymotion, Metacafe, Facebook and Netflix	BranchOut, Facebook, Ecademy, XING, Doostang	Tumblr, Jaiku, Plurk

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2 Relevant data from statistics portal Statista.com <http://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/>

3 SlideShare official website <http://www.slideshare.net/about>

4 Relevant data from statistics portal Alexa.com <http://www.alexa.com/siteinfo/twitter.com>

5 YouTube official website <http://www.youtube.com>

6 Relevant data from statistics portal Statista.com <http://www.statista.com/statistics/274568/quarterly-revenue-of-twitter/>

7 LinkedIn official website <http://www.linkedin.com/company/linkedin>

8 Relevant data from statistics portal Statista.com <http://www.statista.com/statistics/181777/employees-of-twitter/>

## Social Media and Stock Price Informativeness

Fair value determination is a core function of the stock market. Under the assumption that observed prices reflect news and information available, the Efficient Market Hypothesis (EMH) states that markets do provide proper prices without arbitrage opportunities for each stock.

At the same time, there is empirical evidence of comovement in stock prices. Comovement means that prices of individual stocks move together in the same direction. A classical way to measure the degree of comovement for a single stock is to estimate its correlation with a stock market index.

There are two frameworks to explain comovement: a traditional and an alternative one. In the traditional paradigm, a frictionless economy with rational investors exhibits comovement in prices due to comovements in fundamental value (Barberis et al., 2005). The fundamental value is obtained as a sum of expected cash flows for a particular firm discounted at an appropriate interest rate.

The alternative approach questions the market informational efficiency and explains comovement in a different fashion. First, the information is costly (Veldkamp, 2006). So using the purchased information about a particular stock an investor can manage the whole portfolio. Second, stock holdings are often classified by sector. In both cases, a single investment decision is applied to a group of stock without considering differences in individual cash flows. Third, a stock price can take different time to absorb new information. In this case stocks with similar speed of information incorporation show price synchronicity.

Obviously, there are other explanations. More and more researchers consider the aspects of comovement and promote “alternative views”. The problem is that high stock price comovement with a market trend means that it does not reflect performance and future opportunities of the company. It means that the stock price is not informationally efficient anymore. In other words, high stock price comovement is the same as low informational efficiency. Consequently, investors obtain misleading signal from the market, take wrong actions and often incur losses, especially during market slumps (Haggard et al., 2008). Here we should remark that there are different measures of price informational efficiency (Ferreira et al., 2011; Yu, 2011). Below we will consider the most popular one only.

The stock return volatility can be split into two components: one explained by the volatility of the market and the other, firm-specific one (often called as “idiosyncratic”). Formally, in the simplest case we run a regression:

$$r_{i,t} = \alpha_0 + \alpha_1 * r_{m,t} + \varepsilon_{i,t} \quad (1)$$

Where  $r_{i,t}$  is a stock return for firm  $i$  over  $n$ -day period  $t$ ,  $r_{m,t}$  is the stock market index return over  $n$ -day period  $t$  and  $\varepsilon_{i,t}$  is an error term.  $R^2$  estimation based on (1) reflects the fraction of stock  $i$  return volatility explained by the market volatility. Then a natural measure of stock price informativeness is  $\ln(\frac{1-R^2}{R^2})$ .

Recently, research remarked that stock price comovement is driven severely by the informational opacity of the firm (lack of firm specific information and transparency) (Dasgupta et al., 2010). In the light of our discussion above social media is a means to become more transparent and stakeholders-oriented. Almost no research on the causality between involvement in social media use and price informativeness has been done yet. We believe that there is another well-discussed issue: the relation between financial reporting standards in a company and price informativeness. Carrying the same responsibility, social media is close to voluntary financial reporting with a higher focus on non-financial items and direct feedback from investors available.

So Haggard et al. (2008) conclude that extended disclosure policies provide additional firm specific information, diminish stock price comovement and reduces the frequency of stock price

crashes. Fox et al., 2003 demonstrate that after the new mandatory disclosure requirement were imposed in the USA the price-accuracy in stock market has improved significantly and comovement declined. Using data for over 30 countries, Kim and Shi (2010) proved that that “IFRS adoption facilitates the incorporation of firm-specific information into stock prices”, which results in lower stock price synchronicity. Ferreira et al. (2010) confirm that mandatory adoption of IFRS reveals new firm-specific information and reduces stock return synchronicity at the time of implementing new requirements. High auditor quality reduces synchronicity as mentioned in Gul et al. (2010). The finding is confirmed by Yu (2011).

In addition, there are a number of factors we should control discussing stock price comovements and social media use. Stock price synchronicity and crash risk are both reduced with ownership by institutional investors rising. (Ana et al., 2013) The idea behind is that institutional investors monitor the company performance due their large share and investment horizon. In such a way, the problem of management misbehavior is smoothed. The reverse is true for businesses with a high share of short-term traders in equity. In addition, crashes happen when accumulated negative information about the company previously unknown becomes public. Gul et al. (2010) explore the influence of ownership concentration on the amount of firm-specific information in the share price and find an optimal level of 50% by the largest stockholder. The Chinese experience suggests that higher government participation in company equity reduces synchronicity in contrast to the foreign ownership.

Marhfor et al. (2013) report that deeper analyst coverage of a stock does not generate more firm-specific information both in the developed and developing world. This disputable result is partially disproved in Kim and Shi (2010).

Baele et al. (2010) state that liquidity parameters are even more important than macroeconomic ones to explain synchronicity since price for illiquid stocks is very sticky. Jin and Myers (2006) conclude that poor protection of investors decreases the role of firm-specific information due to overall uncertainty. Stock price informativeness is higher for companies with better corporate governance and gender-diverse boards as posited by Yu (2011) and Gul and Srinidhi (2011) respectively.

Next, we will discuss our preliminary attempts to check if the social media use by firm can improve its stock price informativeness as well.

## **Data and methods**

### *Data collected*

Shigina and Vanhee (2012) conducted a survey and initiated telephone conversations with company investor relations departments to find out the ways they use social media.

They also tried to define the importance of social media in the company’s strategy and its influence on the relationship with investors.

To get data, the researchers sent the survey by email to over 300 European companies’ from 9 countries, which are represented on European stock markets. In total, they got 50 completed and 14 uncompleted observations (64 in total).

Firstly, researchers asked what kinds of social media companies use to inform their investors (Figure 2). Most of the companies chose Twitter (25%). Other answers were SlideShare, StockTwits, Flickr, Wordpress and Issuu. Moreover some companies said that they do not use social media directly and only monitor them. Other companies mention that they combine different social media using for example YouTube for company film and Facebook for company profile and LinkedIn to recruit future employees.

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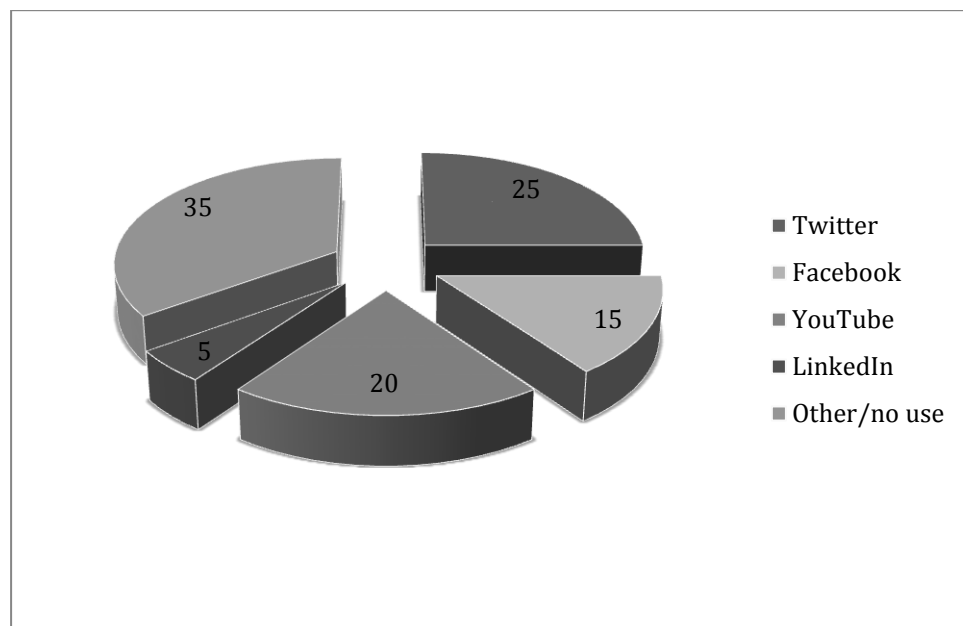


Figure 2. Social media in % (Shigina and Vahnee, 2012)

75% of respondents had been using social media for 1-3 years and 90% companies could employ social media without help of consultants. The most frequent answer for the question about how much money companies spend on social media was «Not disclosed», but still they had a proper one such as 1-2% in average.

To understand how these new services are useful to companies, researchers pursued the goal to measure company's attitude to social media. You can see the results in percentages in Figure 3.

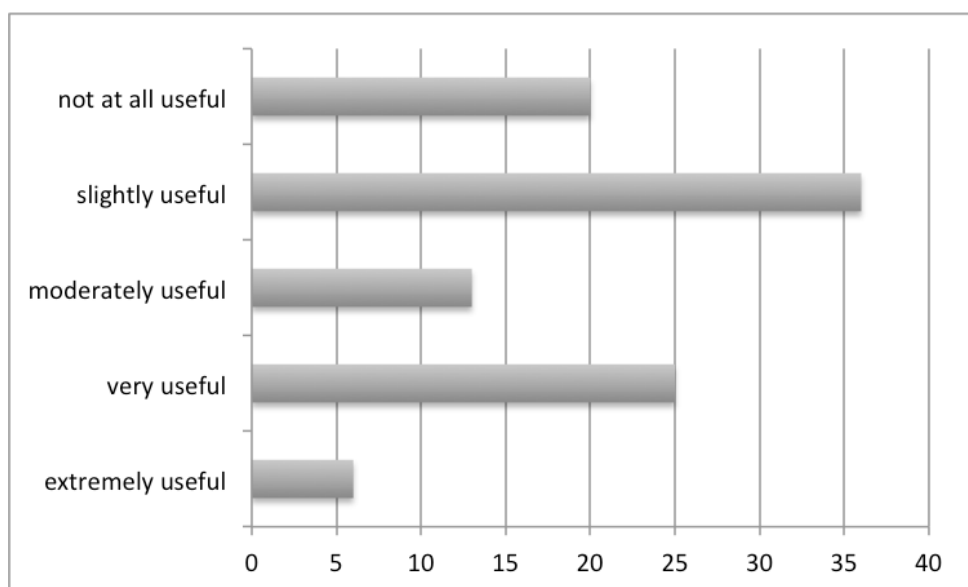


Figure 3. Usefulness of social media in % (Shigina and Vahnee, 2012)

The next question was about target audience for social media. The most common answers were about customers and investors (69%). The companies also mentioned potential employees and the general public. They also asked if respondents share information about the stock market to investors via social media and see the connection between stock price and social media. For both question they got negative answers – 72% and 85% respondents said «no» accordingly.

In addition there was a question about the expected percentage of investors who follow company via social media. They obtained a mean estimate of 5%.

### *Preliminary Results*

A lot of companies still underestimate the value of social media within investor relationship departments. The survey showed that European companies have discovered some advantages of social media within investor relationship departments in recent years. Hence, we are convinced that in the current business environment, organizations should no longer underplay the importance of social media in the company strategies.

### *Further steps and limitation of our analysis*

In our future empirical research we will try to provide significant evidence that active application of social media does improve the stock price informativeness for a particular firm and overall market efficiency. There is a number of useful quantitative methods to handle this issue. The idea is to employ the changes in stock price comovement to measure stock price informativeness as described in section 3; technical and econometric discussions are beyond the scope of this paper.

In 2014 we will reconduct a poll of traded European companies about their involvement into social media use in business and investor relation purposes. Next, using the answers already available and newly collected ones we will construct a measure of company's participation in social media use practices.

We conjecture that smaller comovement and higher stock price informativeness will be observed for companies that use social media more actively. They are expected to be more transparent and investor-friendly, so stock prices should reflect more company specific information and less comovement.

At the same time, we observe some limitation of our research. First, companies are very reluctant to share information. They report that the social media niche is still attractive and undiscovered by businesses. So, a bias can appear in their answers. In addition, they prohibit disclosure of raw answers for any single company, only aggregated information (by region or sector) will be provided. Second, we cannot predict the number of answers obtain in a new poll. The number of newly obtained observations is very important to guarantee the model quality and robustness.

## The Guide of Social Media Implementation

As already discussed social media offer advantages for investor relations departments and stock price informativeness.

In this changing field, investors demand more and more “social” approach for which described further actions are required. A social media-friendly approach by investor relations has become a must instead of a nice to have.

We included an implementation guide of social media techniques for investor relations departments, which consists of four steps (Figure 4).

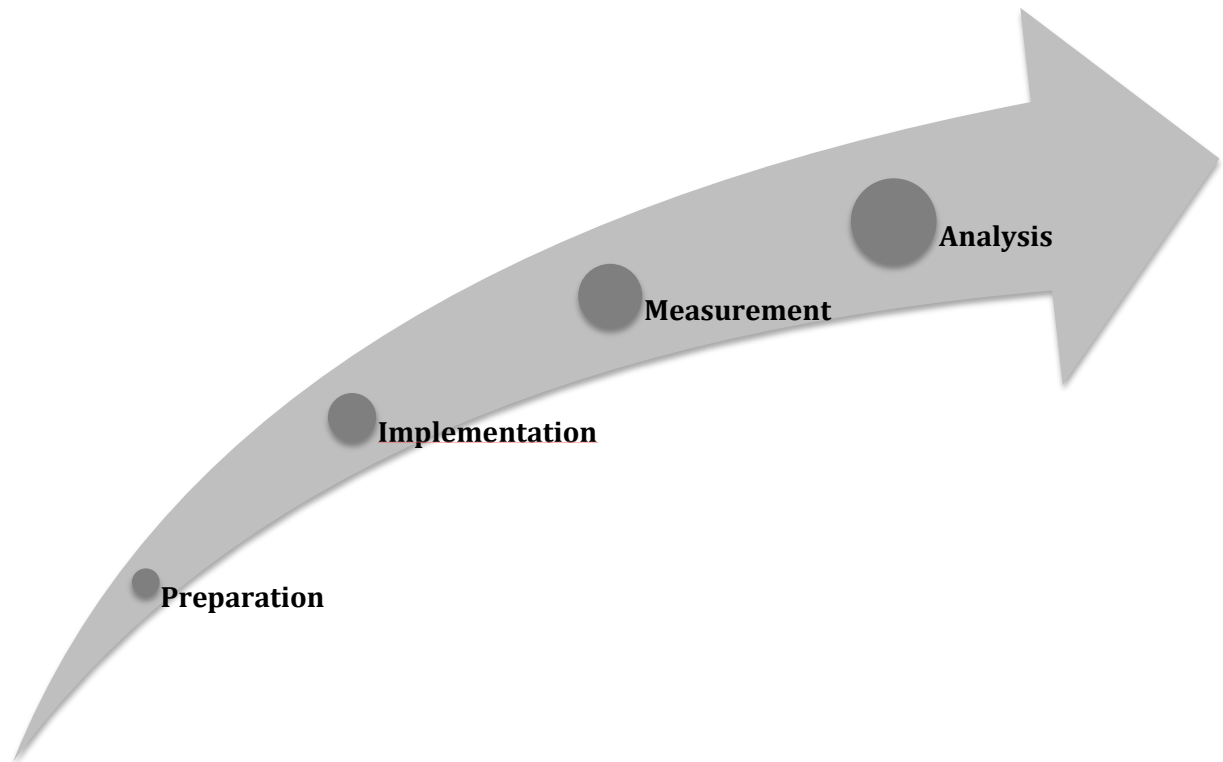


Figure 4. Four steps of social media implementation (author composition)

### *Preparation*

Alike in implementation of any strategy, a thorough research is required before initiating major changes. This involves posing preliminary questions:

- What should be delivered via social media?
- How will the social media component fit in your investor relations department?
- Who will speak to the investment community?
- How much time will be invested in this online part?
- How will success be measured?

Control of what will be posted is very important, especially because the impact of a wrong post can be immense. The World Wide Web has an infinite memory and furthermore, the amplifying

effect of social media emphasizes mistakes by spreading them around swiftly in a viral way. So before making a first post or update, it is recommended that a company define dos and don'ts in a company policy.

Social media policy should set clearly who will be responsible for building and maintaining the social media communications effort, provides guidelines regarding acceptable conduct and establishes the nature and frequency of interaction over social media.

It is very important for a company to anticipate and plan for crisis of communication. Also the policy should refer to technology and intellectual property. This includes a clear statement that the accounts used are company-owned assets.

When clearly defined, the odds that a company's effort will safely get implemented in the overall communications strategy will increase. Unfortunately, a certain risk will remain, but the goal of the policy is to reduce significantly the risk of wrong usage.

Finding out and defining clearly investor's goals is a necessity.

To find out who the investors are which are following your information, there are several tools:

- Initiate a company's closed community

This is comparable with 'old-fashioned' focus groups, a permanent group online, where people are invited to interact with each other upon information. Potential partners include Communispace, Markettools and Passenger.

- Start with brand monitoring of the companies' stock among investors

Advised partners include MotiveQuest, Nielsen Buzz metrics, Communispace, Cymfony which have a solid track record in delivering this kind of report.

Once decided who is going to write the content, it is time for a company to understand its investors' demands and wishes.

In short, investors are interested in all information, which applies to profitability, solvency and liquidity; as these are the three key parameters of a company's actual financial status.

To find out what information is important, the company can cross check with other companies in its industry; organize a poll / survey among the known investors; test in practice which information is most watched.

In order to let investors get acquainted to the new (more active) flow of information, it might be interesting to test this information internally / within a test panel. In this way, the employees whom post content can grow in their role and get used to an action-reaction model.

Once it is decided which content by whom and with whom will be shared, the last preparation part is purely technical. As discussed, there are a lot of social media. The choice of technology should not be too rigid, as social media are evolving rapidly.

Setting up social media profiles and accounts is fast and straightforward. However, the real challenge is ensuring that social media becomes integrated with the company's overall communications effort without posing an unnecessary strain on resources.

## SOCIAL MEDIA FOR THE BENEFIT OF COMPANIES, INVESTORS AND STOCK PRICE INFORMATIVENESS

### *Effective Implementation*

When the preparations are sufficiently done, it is time for effective takeoff of the social media strategy implementation. It is highly recommended to make gradual steps, in order to see how people react and it will be easier for both the company and its investors to get used to the new way.

As more links helps increase the visibility of the company's news in searches, it is recommended to connect information to leading industry experts and journalists whom are following the industry.

### *Measuring Return on Investment*

Once the implementation is complete, we recommend closely measuring results (and return on investments - ROI) in order to spot opportunities to tailor more to the customers need.

The major goal of organizations is to increase its profitability and productivity in all the operations. As businesses engage in determining the amount of resources it will devote to the social media, it must be able to determine ROI accruing from the use of social media platform in its investor relations. Thus, after an online presence is implemented, a company needs to collect and analyze data in order to find out how its investor relations activities resonate with the investor community (Leake et al., 2012).

In determining ROI on the use of the social media, the organization will have to evaluate the success of the social media. Organizations need to analyze the impact of social media on influencing the purchasing and consumer behavior on shares and products / services of the organization, as sales increases are essential (Hoffman and Fodor, 2010).

In addition, the increase in sales used to measure return on investment due to use of social media has been instrumental improving performance of the company. High performance of the company is essential in improving the value of a company's stocks.

Moreover, it is important to mention that costs for establishing a social media strategy for investor relations are negligible, when the company already implemented a social media strategy in other departments; as increasing channels are free of charge and profiles easy to set up.

In contrast, the potential benefits may be unlimited:

- Increased shareholder base with increased contact
- More transparent investor communications,
- Augmented sense of understanding investor need
- Additional relevant feedback from the investment community,
- Improved brand perception

In order to help the company to measure the above-mentioned, there are Web-based tools, which help to improve tracking of online investor relations' efforts. These useful tools can be segmented in three groups: Table 3.

Table 3. Selection of tools to help companies quantify online presence (Joyce, 2012).

Type	Examples	Key data
Traffic & search analytics	<ul style="list-style-type: none"> <li>Google Analytics</li> <li>Compete.com</li> </ul>	Data on the geographic location, bounce rate, visiting frequency, visiting patterns, and utilized keywords of website visitors
Alerts	<ul style="list-style-type: none"> <li>Google Comprehensive Alerts</li> <li>Nielsen Buzzmetrics</li> <li>Stocktwits</li> </ul>	These tools can be set up to alert each time certain content is registered by Google or another search engine or channel (such as Twitter) and may help the company monitor what is being said on the internet.
Social search engines	<ul style="list-style-type: none"> <li>Socialmention.com</li> <li>Infegy Social Radar</li> <li>Search.twitter.com</li> </ul>	Like traditional search engines, these tools help companies search social networking sites in order to monitor buzz.

### Analysis

It is difficult to use one specific social strategy and implement, because there are very few examples and models to be followed. A company needs to be constantly concise about advantages and risks and carry out a meticulous analysis as follows (Figure 5).

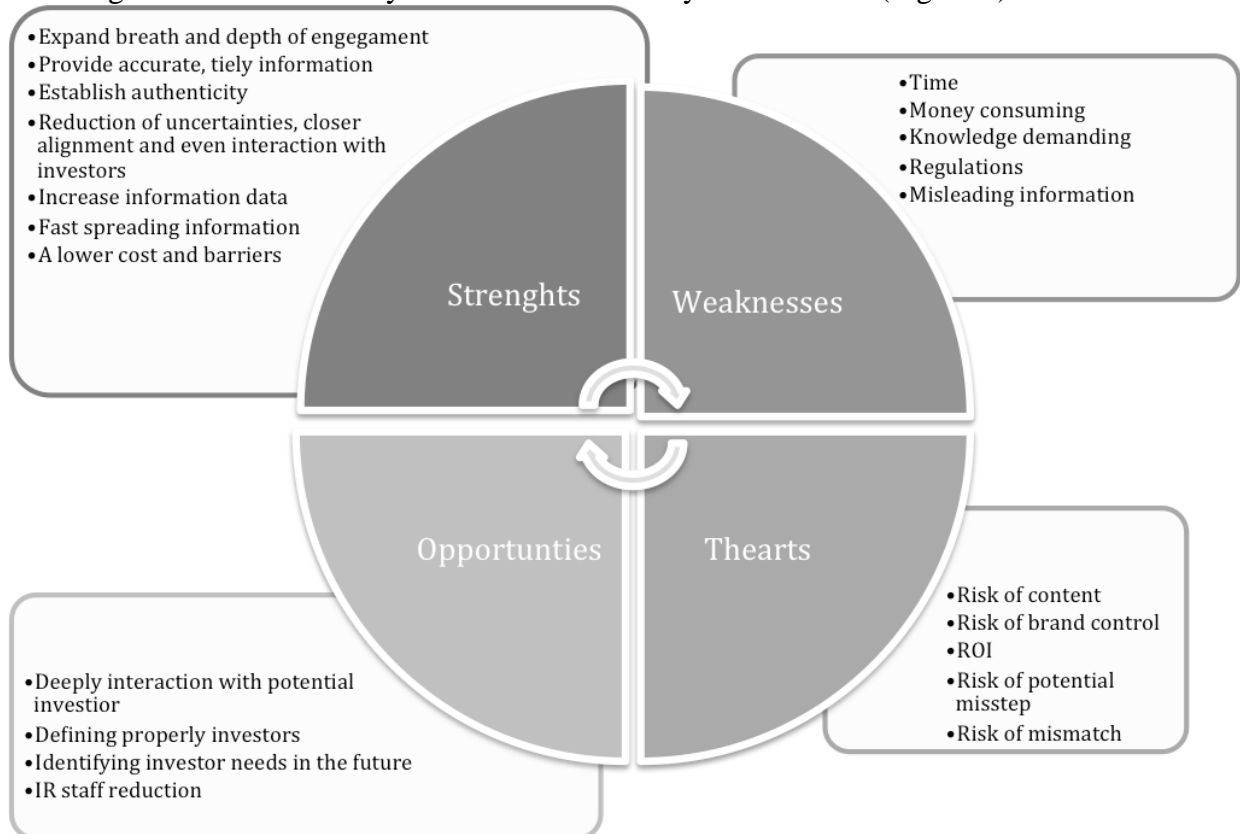


Figure 5. Analysis of social media implementation (author composition)

## **Conclusion**

In this paper we discussed the role of social media for investor relations in a company. We addressed the advantages of social media use such as higher transparency, meeting the investor needs and the ability to obtain feedback rapidly in response to the corporate events. Also we provided a detailed explanation that social media employment may probably improve stock price informativeness. We will continue the unique database collection started in 2012 to obtain a formal confirmation. Finally, we offered the guidance on social media implementation that can be potentially useful for business.

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## STABLE GROWTH RATIO OF STOCK PRICES: EVALUATION AND USE

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**Abstract.** *This paper proposes a new indicator for evaluation of stability of share prices' growth. It considers both the depth and the sequence of changes in share prices, and combines the information on growth and risk (fluctuations) of prices. The practical application of the developed computational algorithm is illustrated using a sample of shares from various stock exchanges across the globe.*

**Keywords:** *evaluation of dynamic characteristics of shares, stability of growth of share prices, stable growth ratio of share prices, evaluation profitability and risk of shares.*

**JEL Classification:** *G10, G11, G15*

### Introduction

Currently even more often for financial decision making are used various indicators, which make possible to estimate qualitative features. In particular, qualitative indicators are further and further useful at decision making in management of companies, branches, investment processes, etc. For example, investors use for choice of investment objects not only indicators of profitability and risk, but also various indicators of management quality etc. Enough large set of quality indicators is used by rating companies. Quality indicators can enter into the composition of main indicators used for decision making, or these indicators can be additional. These indicators can increase efficiency of decision making. At that, most part of quality indicators have enough clear quantitative content.

Actuality and active use of various qualitative indicators promote that the methodology and methods for calculation of these indicators are being constantly developed. Also are being created new indicators. In this research is proposed indicator, which evaluates stability of growth of share price, and in general case is possible to use this approach for estimation of stability of change of other dynamic indexes.

Evaluation of investment decisions can be realized on the basis of various factors. On practice are used row of indicators of value, risk and quality of shares. For investors, traders and other specialist, who should make investment decisions, is important not only direction of change of stock prices, but also dynamic of their variation. Special attention is given to methods for evaluation of fair value of shares and evaluation of amplitude excursion of shares on stock exchanges. At that, it is necessary to consider, that the amplitude excursion of share prices depends from row of factors, including possible speculations on stock exchange. In general case, the range of spread of current values of shares is described by indices of minimum and maximum of shares quotations for the taken time period.

Thus, besides evaluations of risk and profitability of company shares, it is possible to use indicators, which characterize qualitative component of shares behavior, as an example can be Stable Growth Ratio of Stock Prices.

## Literature review

For investors, traders and other specialist, who should make investment decisions, is important not only direction of change of stock prices, but also dynamic of their variation. Analysis of change dynamic of stock prices is realized in various methods of risk evaluation. There were developed large number of risk evaluation methods, among of them VaR, ShortFall, Capital-at-Risk, and row of other classical methods (Erich, 2002; Higgins, 2008). Relative simplicity of VaR calculation has resulted to popularity and wide use of this method in different companies and banks (Esbensen, Guyot, Westad, 2002). For risk evaluation is often used volatility indicator, which calculates amplitude excursion of indexes, in this case stock prices. At that, it is necessary to say, that the amplitude excursion of stock prices depends from row of factors, including possible speculations on stock exchange.

It is necessary to say, that all existing methods of analysis of stock prices movement estimate the change of prices by two ways: first variant - comparison of current indexes with previous, second variant – estimation of statistical changes in the whole for the determined period (John J. Murphy, 2009; Martin Pring, 2013). In both variants is not taken into account history of changes with full sequence.

Therefore is proposed indicator for evaluation of growth stability of stock prices allows consider full sequence price changes. The proposed indicator of stable growth is combination, directly, profitability of stock prices with risk, connected with variation amplitude. Consideration of depth of change of stock prices makes possible to receive more exact evaluation of qualitative behavior of stock prices in market. At that, it is possible to allocate more shallow and more deep changes of stock prices, to analyze causes of these fluctuations etc. Thus, it is possible to use proposed method with the aim to describe qualitative component of shares behavior.

## The Methodology and model

### *The method of evaluation of Stable Growth Ratio of Stock Prices.*

Generally, the share prices movement can be weakly controlled, sporadic (up-down about some stable value), and more controlled, with direction (trend), cyclic, undulating, when the periods of increasing of prices are changed by the periods of decreasing of prices.

Taking into account changes of share prices depth for the analyzed time period, it is possible to receive more exact and quality evaluation of shares movement in market. At that, it is possible to determine shallower or deeper changes of stock price, analyze the causes of such fluctuations etc. This indicator includes both components: risk and profitability.

Stable Growth Ratio of Stock Prices is calculated by the next ratio:

$$SGRSP_{\%} = \frac{GSP^{actual}}{GSP^{base}} * 100\%$$

where SGRSP – Stable Growth Ratio of Stock Prices,

$GSP^{actual}$  – Indicator of actual (real) shares movement for the observation period, for example, n days;

$GSP^{base}$  – Indicator of ideal (best possible dynamic) shares movement for the observation period, for example, n days.

$GSP$  –Growth of Stock Prices is indicator of movement of share prices.

Indicator of ideal movement of shares,  $GSP^{base}$ , is calculated by the method of dynamic connected indicators based on the chain of inequalities of the ideal dynamic of stable growth:

$$SP_0 \leq SP_1 \leq SP_2 \leq SP_3 \leq \dots \leq SP_n$$

where  $SP_0, SP_1, SP_2, SP_3, \dots, SP_n$  – share prices for the different consecutive time periods, for example, it can be daily closing prices of shares during  $n$  days. At that,  $SP_0$  – is share price for the previous day before the first observation day, this price has been considered as base price. The index  $n$  is the total number of days, in other words, time period for analysis of growth stability of shares.

Thus, the ideal dynamic (best possible dynamic of shares movement) can be described by the next set of inequalities:

$$\left\{ \begin{array}{l} SP_1 \geq SP_0 \\ SP_2 \geq SP_0 \\ SP_2 \geq SP_1 \\ \dots\dots\dots \\ SP_n \geq SP_0 \\ SP_n \geq SP_1 \\ \dots\dots\dots \\ SP_n \geq SP_{n-1} \end{array} \right.$$

This set of inequalities describes movement of share prices without loss. Actual movement of stock prices is characterized by stable fluctuations: periods of prices decrease are changed by periods of prices increase. Frequency and duration of such periods depend on a great number of various factors, which are not possible to consider and forecast in practice. The indicator of actual movement of shares,  $GSP^{actual}$ , is calculated by similar algorithm. Thus both, indicator of ideal movement of shares,  $GSP^{base}$ , and indicator of actual movement of shares,  $GSP^{actual}$ , are calculated by the given above set of inequalities.

Let us determine, as far as the set of inequalities, used for describing for the ideal dynamic of stable growth of share prices is useful by analysis of actual movement of share prices. In other words, it should be determined, as far as actual movement of shares for the observation period, for example,  $n$  days, is coincided with the ideal movement of shares for the same period.

Let us consider the calculation algorithm of Stable Growth Ratio of Stock Prices for period of  $i = 1, \dots, n$  days.

The set of indexes, describing depth of increase of share prices for each day of the analyzed time period  $i = 1, \dots, n$  days looks like

$$Y = \{y_i\},$$

where  $y_i$  – depth of increase of share prices for the  $i$  - day, it is calculated as:

$$y_i = \sum_{j=0}^{i-1} a_{ij},$$

and variable  $a_{ij}$  is determined by the next way:

$$a_{ij} = \begin{cases} 1, & \text{if } SP_i \geq SP_j \\ 0, & \text{in all other cases} \end{cases}$$

where  $i = 1, \dots, n; j = 0, \dots, i - 1$ .

Thus, indicator of movement of share prices for the observation period both in ideal case, and actual case, is calculated in general as:

$$GSP = \sum_{i=1}^n y_i$$

*An example of calculation of Stable Growth Ratio of Stock Prices ratio.*

It is presented an example of calculation of the indicator of ideal dynamic of share prices movement for three days. By the ideal dynamic of share prices movement, share price is increased or remained unchanged from day to day for all days of the observation period, thus share prices are higher or equal compared with share prices of previous days of the observation period.

If  $i = 1, 2, 3$ ; that is  $n = 3$ ;  $a_j = 0, 1, 2$ .

Indicator of the ideal dynamic of share movement  $GSP^{base}$ , is calculated by the chain of inequalities of the ideal dynamic of stable growth. For the analyzed three days, it looks:

$$SP_0 \leq SP_1 \leq SP_2 \leq SP_3$$

Calculation algorithm:

1. For analysis of the first day, on the basis of ideal dynamic of stable growth,  $SP_0 \geq SP_1$ . The depth of share price increase,  $y_1 = 1$ , inasmuch as  $a_{10} = 1$
2. For analysis of the second day, on the basis of ideal dynamic of stable growth,  $SP_2 \geq SP_0$ ;  $SP_2 \geq SP_1$ . The depth of share price increase,  $y_2 = a_{20} + a_{21} = 2$ , inasmuch as  $a_{20} = 1$ ,  $a_{21} = 1$
3. For analysis of the third day, on the basis of ideal dynamic of stable growth,  $SP_3 \geq SP_0$ ;  $SP_3 \geq SP_1$  and  $SP_3 \geq SP_2$ . The depth of share price increase,  $y_3 = a_{30} + a_{31} + a_{32} = 3$ , inasmuch as  $a_{30} = 1$ ,  $a_{31} = 1$  and  $a_{32} = 1$ .
4. The row of increase depth indicators for the observed three days looks:  
 $Y = \{1, 2, 3\}$
5. The indicator of ideal movement of share prices for the analyzed period (in this case, three days) is equal:

$$GSP^{base} = \sum_{i=1}^3 y_i = 1 + 2 + 3 = 6;$$

For analysis and calculation it is possible to use lower triangular matrix, whose for considered calculation example of the indicator of ideal movement of share prices looks:

$$A = \begin{pmatrix} a_{10} & 0 & 0 \\ a_{20} & a_{21} & 0 \\ a_{30} & a_{31} & a_{32} \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$$

In the capacity of lower triangular matrix is used square matrix, whose all elements above the main diagonal equal zero.

Similarly is carried out calculation of the indicator of ideal movement of shares for  $n$  days.

In general case, calculation of indicator of the ideal movement of share prices for  $n$  days includes next steps:

1. On the basis of ideal dynamic of stable growth, row of indexes of depth of growth of share prices looks:  $Y^{base} = \{1, 2, 3, \dots, n\}$ ;
2. The indicator of ideal movement of shares for  $n$  days is equal:

$$GSP^{base} = \sum_{i=1}^n y_i = \frac{n * (n + 1)}{2};$$

In this case, it is possible to use the ratio  $\frac{n*(n+1)}{2}$  only for evaluation of indicator of ideal movement of shares on the basis of the ideal dynamic of stable growth.

It is possible to use for analysis and calculation the lower triangular matrix, whose in general case for n days looks:

$$A = \begin{pmatrix} a_{10} & 0 & \dots & 0 \\ a_{20} & a_{21} & \dots & 0 \\ \dots & \dots & \dots & \dots \\ a_{n0} & a_{n1} & \dots & a_{nn-1} \end{pmatrix}$$

General view of matrix for analysis of shares movement for ten days looks:

$\begin{matrix} j \\ i \end{matrix}$	SP <sub>0</sub>	SP <sub>1</sub>	SP <sub>2</sub>	SP <sub>3</sub>	SP <sub>4</sub>	SP <sub>5</sub>	SP <sub>6</sub>	SP <sub>7</sub>	SP <sub>8</sub>	SP <sub>9</sub>	$\sum_{j=0}^{i-1} a_{ij}$
SP <sub>1</sub>	$a_{10}$	0	0	0	0	0	0	0	0	0	$y_1$
SP <sub>2</sub>	$a_{20}$	$a_{21}$	0	0	0	0	0	0	0	0	$y_2$
SP <sub>3</sub>	$a_{30}$	$a_{31}$	$a_{32}$	0	0	0	0	0	0	0	$y_3$
SP <sub>4</sub>	$a_{40}$	$a_{41}$	$a_{42}$	$a_{43}$	0	0	0	0	0	0	$y_4$
SP <sub>5</sub>	$a_{50}$	$a_{51}$	$a_{52}$	$a_{53}$	$a_{54}$	0	0	0	0	0	$y_5$
SP <sub>6</sub>	$a_{60}$	$a_{61}$	$a_{62}$	$a_{63}$	$a_{64}$	$a_{65}$	0	0	0	0	$y_6$
SP <sub>7</sub>	$a_{70}$	$a_{71}$	$a_{72}$	$a_{73}$	$a_{74}$	$a_{75}$	$a_{76}$	0	0	0	$y_7$
SP <sub>8</sub>	$a_{80}$	$a_{81}$	$a_{82}$	$a_{83}$	$a_{84}$	$a_{85}$	$a_{86}$	$a_{87}$	0	0	$y_8$
SP <sub>9</sub>	$a_{90}$	$a_{91}$	$a_{92}$	$a_{93}$	$a_{94}$	$a_{95}$	$a_{96}$	$a_{97}$	$a_{98}$	0	$y_9$
SP <sub>10</sub>	$a_{10\ 0}$	$a_{10\ 1}$	$a_{10\ 2}$	$a_{10\ 3}$	$a_{10\ 4}$	$a_{10\ 5}$	$a_{10\ 6}$	$a_{10\ 7}$	$a_{10\ 8}$	$a_{10\ 9}$	$y_{10}$

Sum of elements in each row of matrix describes depth of growth of share price for corresponding day, number of row indicates analyzing day. Sum of elements in 1<sup>st</sup> row of matrix describes depth of growth of share prices for the 1<sup>st</sup> day, sum of elements in 2<sup>nd</sup> row – depth of growth of share prices for 2<sup>nd</sup> day etc.

Using a similar algorithm for calculation of actual movement of shares, we will receive:  
 $y^{actual} = \{y_i^{actual}\},$

$$GSP^{actual} = \sum_{i=1}^n y_i^{actual}$$

Let us consider practical example calculation of actual indicator of share prices movement.

For practical example for calculation of movement of share prices is used data of the company “Toyota” at the Frankfurt stock exchange (Xetra) for the observation period from 01.07.2011 to 15.07.2011. Thus, it is carried out analysis for 10 working days, at that the close price for 10.07.2011 is considered as base price.

**Tab. 1. Basic data analysis of movement of share prices of “Toyota”**

Number of observation	Date	Share price (closing), Euro	Symbol
0	01.07.2011	28,25	SP <sub>0</sub>
1	04.07.2011	28,175	SP <sub>1</sub>
2	05.07.2011	28,59	SP <sub>2</sub>
3	06.07.2011	27,91	SP <sub>3</sub>
4	07.07.2011	27,76	SP <sub>4</sub>
5	08.07.2011	28,4	SP <sub>5</sub>
6	11.07.2011	28,495	SP <sub>6</sub>
7	12.07.2011	28,82	SP <sub>7</sub>
8	13.07.2011	29,025	SP <sub>8</sub>
9	14.07.2011	29,035	SP <sub>9</sub>
10	15.07.2011	29,5	SP <sub>10</sub>

Thus, we have actual indicators of share prices for 10 days, that is  $n = 10$

The ideal indicator of movement of share prices on the basis of ideal dynamic of stable growth is equaled:

$$GSP^{base} = \frac{n * (n + 1)}{2} = \frac{10 * (10 + 1)}{2} = 55$$

Real indicators of depth of growth of share prices for 10 days are equaled:

$y_1 = 0$ ;  $y_2 = 2$ ;  $y_3 = 0$ ;  $y_4 = 0$ ;  $y_5 = 4$ ;  $y_6 = 5$ ;  $y_7 = 7$ ;  $y_8 = 8$ ;  $y_9 = 9$ ;  $y_{10} = 10$

Row of indexes of depth of growth of share prices looks:

$y^{actual} = \{0; 2; 0; 0; 4; 5; 7; 8; 9; 10\}$

Actual indicator of shares movement for 10 days is equaled:

$$GSP^{actual} = 0 + 2 + 0 + 0 + 4 + 5 + 7 + 8 + 9 + 10 = 45$$

The lower triangular matrix for this example is constructed according to the next scheme:

	SP <sub>0</sub>	SP <sub>1</sub>	SP <sub>2</sub>	SP <sub>3</sub>	SP <sub>4</sub>	SP <sub>5</sub>	SP <sub>6</sub>	SP <sub>7</sub>	SP <sub>8</sub>	SP <sub>9</sub>
SP <sub>1</sub>	$a_{10}$	0	0	0	0	0	0	0	0	0
SP <sub>2</sub>	$a_{20}$	$a_{21}$	0	0	0	0	0	0	0	0
SP <sub>3</sub>	$a_{30}$	$a_{31}$	$a_{32}$	0	0	0	0	0	0	0
SP <sub>4</sub>	$a_{40}$	$a_{41}$	$a_{42}$	$a_{43}$	0	0	0	0	0	0
SP <sub>5</sub>	$a_{50}$	$a_{51}$	$a_{52}$	$a_{53}$	$a_{54}$	0	0	0	0	0
SP <sub>6</sub>	$a_{60}$	$a_{61}$	$a_{62}$	$a_{63}$	$a_{64}$	$a_{65}$	0	0	0	0
SP <sub>7</sub>	$a_{70}$	$a_{71}$	$a_{72}$	$a_{73}$	$a_{74}$	$a_{75}$	$a_{76}$	0	0	0
SP <sub>8</sub>	$a_{80}$	$a_{81}$	$a_{82}$	$a_{83}$	$a_{84}$	$a_{85}$	$a_{86}$	$a_{87}$	0	0
SP <sub>9</sub>	$a_{90}$	$a_{91}$	$a_{92}$	$a_{93}$	$a_{94}$	$a_{95}$	$a_{96}$	$a_{97}$	$a_{98}$	0
SP <sub>10</sub>	$a_{100}$	$a_{101}$	$a_{102}$	$a_{103}$	$a_{104}$	$a_{105}$	$a_{106}$	$a_{107}$	$a_{108}$	$a_{109}$

The  $y_i$  values – are the sums of matrix rows, and  $GSP^{actual}$  - total sum of matrix elements. For the considering example of actual movement of share prices for 10 days is calculated the ratio “Stable Growth Ratio of Stock Prices”:

$$SGRSP = \frac{GSP^{actual}}{GSP^{base}} = \frac{45}{55} = 81,82\%$$

This approach to evaluation of growth stability of share prices, based on of movement of prices company's shares, allows to take into account not only stock price increase (decrease), but also the depth of their increase (decrease) too. Thus, it is possible to consider *Stable Growth Ratio of Stock Prices* as new informative indicator for evaluation of shares movement on stock exchange.

## The findings

### *Practical evaluation and analysis of Stable Growth Ratio of Stock Prices*

Characteristics and possibilities of this indicator are analyzed on practical examples. There are analysed quotations of shares of 7 companies from automotive branch. Share quotations are given from several stock exchanges for the period of (June 30, 2009 - June 30, 2014). Shares are evaluated by the next way:

- risk, VaR, annually, in % for 1 year
- profitability, %, for 1 year
- SGRSP, %, average value for 1 year by 4 quarterly matrixes (size of matrix: 66x66)

## STABLE GROWTH RATIO OF STOCK PRICES: EVALUATION AND USE

Let us carry out comparative analysis of stability ratio of share prices with indicators of risk and profitability of shares. For comparative analysis is used VaR indicator with evaluation period of 10 days.

Annual profitability is calculated by the next formula:

$$Profitability = \frac{profit}{buying\ price} \times \frac{365}{period\ (days)} \times 100\% ,$$

where, “*profit*” is the difference between “*buying price*” and real (actual) share price; “*buying price*” is the sum of investment; “*period (days)*” is the period of share possession (in this case, possession period is equal to analyzed period).

Data by carried out calculations and analysis of received results are presented below in tables and diagrams.

Tab. 2. Indicators of analysis of shares of companies for the period from June 30, 2009 to June 30, 2014 (annual indicators)

Stock Exchange	Indicator	Daimler AG	BMW AG	Volkswagen AG	GM Motor Co. plc.	Ford Motor Co. plc	Toyota Corp. plc	Honda Motor Co. Ltd.
Xetra	VAR, %	3,39	3,03	3,56	3,12	3,7	3,41	
	Profitability, %	52,23	16,85	20,98	11,74	15,45	27,05	
	SGRSP, %	76,5	57,83	62,51	33,01	52,17	55,17	
NYSE	VAR, %				3,41	3,39	3,39	3,21
	Profitability, %				37,38	24,24	24,23	4,51
	SGRSP, %				60,73	49,42	52,97	53,43
Tokyo	VAR, %						4,17	3,9
	Profitability, %						41,27	18,84
	SGRSP, %						60,48	59,5
OTC Market	VAR, %	3,27	3,35	3,62			3,48	2,91
	Profitability, %	58,12	22,15	25,83			28,08	12,38
	SGRSP, %	74,69	59,76	64,98			53,5	56,53

Among all companies best SGRSP indicators was observed at “Daimler AG”, and the worst at “GM” on Xetra. Indicator SGRSP may have different meanings in different markets by the one company, for example, company “GM” has SGRSP value 33,01 on Xetra and, at the same time, 60,73 on NYSE.

It is analysed possibilities of use of SGRSP in evaluation of shares along with indicators of profitability and VaR. In research are evaluated indicators of analyzed companies by correlation coefficients (Tab. 3.). It is received in average positive interrelation data between profitability indicator and SGRSP. Other interrelations are negative or insignificant. Data of interrelations are varied depend on stock exchange. All this indicate, that proposed SGRSP indicator is not analog of risk or profitability. It is shown on the Fig. 1.

Tab. 3. Data of interrelations of various indicators, used for evaluation of shares of analysed companies

Indicators	Automotive companies
VaR and Profitability	-0,14
VaR and SGRSP	-0,1
Profitability and SGRSP	0,578

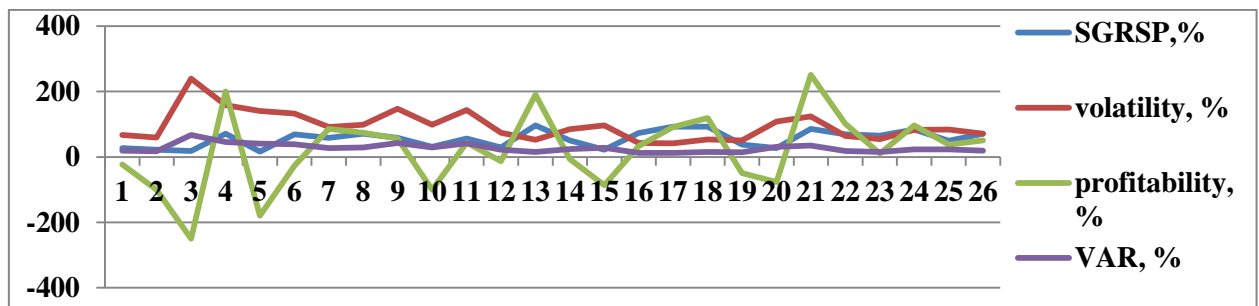


Fig 1. Comparison of various indicators of share quotations (quarterly data by the shares of “Volkswagen AG”)

The values of SGRSP are positively correlated with profitability of shares and have mainly negative correlations with VaR values. Furthermore, the SGRSP ratio with value more than 50% indicates increase of profitability of company’s shares. However, SGRSP ratio is not analog of stocks profitability, as they have different correlations with VaR.

By carrying out of research by the ratio of growth stability of share prices is considered the question of the optimal time period for SGRSP calculation. This period was estimated based on the maximum value of “y” indicator. It was found that the maximum value is 65 (it was found no companies with more than 65 consecutive trading days without loss in closing price of shares), so the time period for the analysis of the quarter (66 days) is the best.

It is carried out comparison of data of actual depth of growth of shares of company “Volkswagen AG” by SGRSP, % with ideal dynamic of shares growth. Results are presented quarterly, for 1 year.

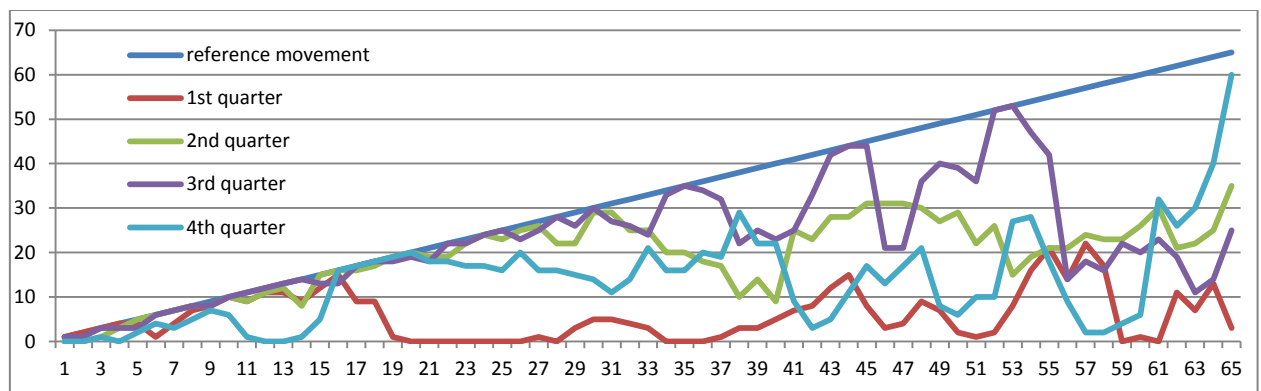


Fig. 2. Comparison data of values of depth of growth of shares for the company “Volkswagen AG” with depth of growth of shares for ideal dynamic (quarterly for observing annual period)

Tab. 3. Quarterly analysis of data for shares of the company “Volkswagen AG”.

Time Period	3 <sup>rd</sup> quarter 2011	4th quarter 2011	1 <sup>st</sup> quarter 2012	2 <sup>nd</sup> Quarter 2012
SGRSP(65),%	18,88	58,93	69,88	41,89
Profitability, %	-0,27	0,14	0,16	0,04
$y_i^{max}$	22	35	53	60

The diagram on the Fig. 2 shows the depth of growth of share prices of the company “Volkswagen AG” within the analyzed time period (66 trading days). However  $y_i^{max}$  value is not always corresponded to the best SGRSP value (Tab.3). Analysis of comparison of various indicators used for evaluation of shares of companies, which are connected by branch belonging, is shown, that SGRSP is integral evaluating indicator, which combines features of indicator of profitability of shares and features of risk, calculated by VaR method.

## Summary and conclusions

The ratio of stability of growth of share prices, SGRSP, makes it possible to receive evaluation of qualitative behavior of share prices on market. It is reached for account of considering of depth of change of share prices. As it is shown by practical analysis, SGRSP can be used on a par with indicators of VaR and profitability for analysis of shares. This indicator is possible to use for decision making by buying of shares. Regarding forecasting possibilities, it is necessary to carry out further research.

Thus, on the basis of carried out research, it is possible to make next conclusions:

- It is possible to use SGRSP ratio on the par with VaR and profitability indicator for evaluation and analysis of shares of company, for comparative analysis of companies for investment decisions making.
- SGRSP ratio makes possible to receive estimation of qualitative behavior of shares in market at the expense of taking into account the depth of change of stock prices
- SGRSP ratio is integral estimation indicator, which combines features of indicators of profitability and risk, calculated by VaR method.
- SGRSP ratio with value more than 50% indicates definitely, that of profitability of shares increases
- It is recommended to use SGRSP ratio with period of 47-60 units (trade days)

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# QUALITY-IMAGE OF STOCKS IN MAI AND JUDGMENT OF INVESTORS: EMPIRICAL EVIDENCE OF CG AND ROIC

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**Abstract.** *The objective of this paper was to examine the relationship between*

*Quality-Image (QI) of stocks; corporate governance (CG), return on invested capital (ROIC) and the stock price of listed companies in Market for Alternative Investment (MAI) by using Feltham – Ohlson (FO) Valuation Model. The population for this study was 44 listed companies in MAI which their securities were first traded before 2008. Regression analysis was used to test the research hypotheses. The findings showed that the QI of stocks met the “Clean surplus relation” condition and furthermore, with 95% confidence, the change in stock price, during 2009-2011, could be explained by the model. Nonetheless, the unsystematic correlations which did not follow FO framework had provided 3 conclusions- (1) the liability and abnormal earnings of listed stocks in MAI during 2009-2011 might not be relevant to determine the firms’ value (2) investors’ decision would be different from the normal situation, and (3) investors did not pay much attention to external QI (CG) but they possibly used internal QI (ROIC) in their judgments.*

**Keywords:** *CG Rating, Corporate Governance, CG, FO Model, ROIC, Firms’ value, Quality-Image, Stock price.*

## Introduction

The major operating guideline of the Market for Alternative Investment (MAI) is to focus on small and medium enterprises (SMEs)-breakthrough for their preparation of competitiveness and business potential. To achieve its goal, MAI set the Disclosure-Based for SMEs to follow as publicly listed company. The Disclosure-Based requires SMEs to give their information not only accounting data but also other information/non-accounting data that sufficiently enough for investors’ decision making. Regarding other information, this paper tries to find out whether investors use the other information which stand for Quality-Image (QI) of stocks in decision making or not. In order to study, two publicized information have been carefully selected to meaningfully represent QI of listed stocks.

Since 1997 financial crisis (Montreevat, 2006), the Thai Government has prioritized the improving of corporate governance (CG). The government and its agencies have conducted public campaigns to raise public awareness on the benefits of good CG. In the same way, CG

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is motivated, by the Board of Governors of the Stock Exchange of Thailand (SET), to be a necessary tool for listed companies to have a system establishing the transparent working environment and enhancing the company's competitiveness to preserve capital and to increase shareholders' long-term value. It is believed that CG Rating will help investors to differentiate the best promising stock from others. Therefore from formal agreement, the Thai Institute of Directors (IOD) has been conducting annual surveys on the state of corporate governance of listed companies in Thailand, since 2001, and announcing the companies' rankings according to their CG performance on "voluntary" CG Codes. The IOD's survey results have been endorsed by the National Corporate Governance Committee (NCGC) and they have been used by SEC and SET in providing a roadmap for improving CG. In consequence, NCGC has disclosed CG Rating to public and featured it as equally as financial data of listed companies while SEC tries to persuade brokers and investors to use CG Rating in decision making.

To be an on-going listed stock in MAI, listed company has to push itself through SET's vital rules and regulations to improve the quality of its business operation for capital market participants and to attract foreign investments. Rationally, the longer the company is listed, the healthier and more competitiveness it will be. However, maximizing innovative company value is rather hard for management team, especially in the unstable economy. In addition, a company's value is different for different investors - buyers and sellers (Fernandez, 2002). And of course, different buyers/sellers, usually, have different definitions for valuing a company.

Traditional valuation methods are based on financial statements but many studies, recently, determine to find the relationship between companies' value and other performance indicators. New emphasis which has been considered in measuring company's value is intellectual capital (IC). IC is all non-financial assets of a company and not presented in the statement of financial position (Frykman and Tolleryd, 2010), so called intangible assets, such as human resources, skills, knowledge, processes and innovation capabilities (Wang, 2008). Many researchers recognize IC as important strategic assets for sustainable corporate competitive advantages, especially innovative firms, and study the relationship between IC and company performance by selecting several indicators such as return on invested capital (ROIC), value added and Tobin's Q. Frykman and Tolleryd (2010) found that company value was created if ROIC exceeded the cost of capital over time. Supported evidence came from Berzkalne's paper (2013) which concluded that (1) from 2005-2008, ROIC exceeded WACC for Latvian listed companies, therefore, value was created, and (2) the company value and ROIC increased with the increase in value creation efficiency. And the relationship between company value and ROIC was stronger for Main list companies than for Secondary list companies.

As SEC believes that CG Rating can help investors to differentiate the best promising stock from the others, this paper will choose CG Rating as an external QI of listed stocks. For an internal QI of listed stocks, this paper will choose ROIC as the indicator for the company's value creation. Besides, the CG, itself, is found to be the tool to enhance the company's competitiveness to preserve capital and finally, increase shareholders' long-term value. Likewise, ROIC confirms the sustainable corporate competitive advantages. Therefore, this paper will choose a valuation model which can expose the relationship of stock price, CG Rating, ROIC and some accounting data in financial statements which represent company's health. In order to analyse all required variables, the basic Feltham-Ohlson (FO) valuation model is picked up for this study.

Apart from the introduction, the rest of this paper is orderly as follows - the second part is hypothesis development; the third part is sample and research methodology; the fourth part is result of the study and, finally, summary and conclusion.

## **Review of Literature and Hypothesis Development**

### *External QI of stock: Corporate governance (CG)*

Black (2001) was one of the first to study the relationship between CG and the firm's performance and found a positive relation. Gompers, Ishii and Metrick (2003) used Return on Asset-ROA, net profit and growth rate as a performance measurement in their study and found the high positive correlation between CG and firm performance. Later the study of Brown and Caylor (2004) found the relationship between bad corporate governance and lower performance. In another study, Drobetz, Schilhofer and Zimmerman (2004) found positive impact of CG to firm's value and when they compared performance between the good CG firms and the bad CG firms, the result showed that investors gave their attention to performance of the good CG firms. Moreover, Durnev and Kim (2007), Klapper et al. (2002), Black, Jang and Kim (2006) also, provided evidences that companies with higher governance and transparency scores enforced higher firm values—and that governance valuation effect was more pronounced in countries with weaker legal systems. On the contrary, Bebchuk and Ferrell (2009) found that increases in the level of an entrenchment index based on six governance provisions are monotonically associated with economically significant reductions in firm valuation. They also found that firms with higher levels of the entrenchment index were associated with large negative abnormal returns during the 1990-2003 periods.






The adoption of CG practices to stock markets in developing countries stimulated new approaches in research and study. Such as Utama and Utama (2005), who studied the effect of CG to the performance of the firm measured by Economic Value Added (EVA) and found that CG index had positive and significant effect to EVA. Besides, they investigated the effect of CG index to ROA and ROE, as the measurement of firm performance, and the result showed that CG index had positive and significant effect to these performance measurements. A few years later, the study of Martani and Saputra (2009) had the same conclusion, listed companies which had high CG did have higher EVA than those which had lower CG. Morey et al. (2009) studied the correlation between governance quality and share prices in emerging markets, using samples from 21 countries, they found that improvements in CG were associated with higher share prices. Recently, Moradi et al. (2012) investigated the effects of corporate governance mechanisms and financing activities on firms' performance, 84 firms listed on Tehran stock exchange was random sampling, their findings revealed that CG, financing decisions and capital structures were affected by firms' performance. In the same year, Ergin (2012) had studied listed companies in Turkey's stock exchange and used the price model as a mean to find out whether investors considered using CG to evaluate price of stock. His results showed that CG rankings were positively and significantly associated not only with the financial performance but also with the accounting performance.

In the meantime, as for Thailand, a survey of 202 firms listed on the SET in mid-1996 by Price Waterhouse (1997) revealed that about 70% of senior management felt that the improvements should be made on CG issues in Thailand and that confirmed the weaknesses in CG during the 1990s. Hence, after the economic crisis in year 1997, Thailand had been

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deeply realized the importance of the rebuilding capital market confidence by monitoring strong disclosure and accounting standards as well as practices, legal and regulatory enforcement, and CG. Since then, significant CG reforms had been introduced and were underway, including the adoption by the SET of 15 Principles of Good CG. To promote good practices, the Thai Rating and Information Service (TRIS) had been assigned by the authorities as the sole corporate governance rating agency for listed companies in Thailand. The Stock Exchange of Thailand (SET) and Stock Exchange Committee (SEC) had provided incentives to companies to be rated by the TRIS as a means of promoting good practices. Several listed firms had already been rated. In December 1999, The Thai Institute of Directors Association (IOD) was found with the support of SET, the Bank of Thailand, and the World Bank. Apart from providing various training programs, the Thai IOD, into acting since 2001, conducts research and surveys on corporate governance. This report has been recognized by the National Corporate Governance Committee and agencies concerned as the most comprehensive corporate governance study of Thai listed companies to date (Montreevat, 2006).

The Thai IOD's assessment criteria for CG are based on the principles of good corporate governance by the Organization for Economic Cooperation and Development and by the Stock Exchange of Thailand. The sources for information scoring are – company annual report, annual information filling (Form 56-1), notice and minutes of companies' shareholders meeting, company website, information on SET/SEC database, and other publicly available information. After scoring, listed companies are classified into six groups according to their corporate governance scores (Figure 1) in the CGR publication. And list of companies receive good CG rating and above will be publicized by SET and IOD.

Score	Range number of Logo (publicized)	Description
90-100		<b><i>Excellent</i></b>
80-89		<b><i>Very Good</i></b>
70-79		<b><i>Good</i></b>
60-69		Satisfactory
50-59		Pass
Lower than 50	No logo given	N/A

Source: Corporate Governance Report of Thai Listed Companies (CGR) 2006.

Figure 1: Classified CG scores, Logo, and description

### *Internal QI of stock: Return on invested capital (ROIC)*

Recently, corporate finance and valuation have been emphasizing on measuring and forecasting returns earned by business on both investments made in the past and expected future investments (Damodarun, 2007). A firm that generates higher returns on an investment than its costs is earning excess returns and will trade at a premium over a firm that does not

earn excess returns. And if that firm continues generating positive excess returns on new investments in the future, its value will increase as growth increases.

Theoretically, company value is determined by its discounted cash flows, and value is created only when company invests capital at returns that exceed the cost of that capital (Copeland, et al., 1996). Hence, modern management uses valuation analysis to develop strategy and operation throughout an organization in order to maximize the value of his/her corporation. Since value is based on discounted free cash flows, the key value drivers of the business must be the drivers of free cash flow, too. Among the key value drivers, ROIC is the most important one because ROIC and the proportion of its profits that is invested for growth drive free cash flow, which in turn drives value.

The return on invested capital (ROIC) is a tool that can tell management and investors that how good a company is at turning capital into profits. And for this reason, ROIC is always used to evaluate the value creation capability of a firm. Practically, ROIC is calculated as follows: (Damodarun, 2007)

$$\text{ROIC}_t = \frac{\text{Operating Income}_t (1 - \text{tax rate})}{\text{Book Value of Invested Capital}_{t-1}}$$

There are 4 key components to this equation – (1) the use of “*operating income*” in the numerator, (2) the “*tax adjustment*” to the operating income, (3) the use of “*book values*” for invested capital, rather than market values, (4) the timing difference.

The definition uses after-tax operating income for the numerator because the ROIC measures return generated on all capital, liability and equity, which invest in assets. Consequently, it has to consider earnings to all kind of investors, lenders and stockholders. So, a measurement of pre-debt’s return earnings, operating income, is used in the computation and adjusted for taxes to arrive at an after-tax return on capital. This paper uses the reported earnings before interest and taxes (EBIT) and adjusts it for the assumed taxes paid on that measure of income.

For denominator, the definition uses book value of invested capital because it is trying to compute the return earned on the capital invested in existing assets and it is assuming that the book value of debt and equity effectively measures this capital investment. Using the market value of equity is inappropriate because it will cause 2 problems for this definition:

1. The market value of equity includes the expected value of growth assets, which cannot generate operating income today. Consequently, the return on capital computed using market value of debt and equity for growth firm will be biases downwards, not because the firm has taken poor investments but because its market value incorporates expectations for the future.
2. The market value marks up the value of existing assets to reflect their earning power. In other words, even if there were no growth assets, using the market value of existing investments in this computation will generate the unsurprising result that the return on capital is equal to the cost of capital.

To calculate the book value of invested capital, this paper uses accounting data at the right side of the statement of financial position: (Copeland, et al., 1996)

$$\text{Total invested capital} = \text{Adjusted equity} + \text{All interest-bearing debt}$$

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$$\text{Adjusted equity} = (\text{Equity} + \text{Deferred income taxes-liability})$$

Where:

Equity = the sum of equity accounts and the minority interest

Interest-bearing debt = the sum of long-term debt, short-term debt, current maturities of long-term debt and capitalized leases

Logically, deferred income taxes-liability is a part of capital because it is a quasi-equity account. For economic analysis, it is more like equity because the fund belongs to the shareholders and the shareholders expect to earn a return on this fund. Moreover, in calculating the return that one will earn on his/her investment, it is common to divide earnings for the year by the money invested at the beginning of the year.

There are many articles and studies that put their interests in ROIC and firm value such as Cruise (2012), Koller, T. & Jiang, B. (2006, 2007), Nadim (2013), Lloyd and Davis (2007), Bernstein Research (2010), etc..

### *Feltham - Ohlson valuation model*

The most prominent valuation model in the empirical accounting research is the Feltham-Ohlson (FO) model (1995). The two main assumptions of FO model are, first, the relevance of publicly disclosed accounting information and firm's market value and second, the linear information dynamics.

Many studies attempted to form models that could predict the reaction of stock market to disclosed information, especially accounting data in financial statements. Ohlson (1995) and Feltham & Ohlson (1995) had proposed a basic valuation model which expressed the firm value as the sum of traditional accounting data, highlighted by abnormal earning. The stated model defines the firm value ( $P_t$ ) as the summation of the book value of shareholders' equity ( $y_t$ ), same year, and the present value of future abnormal earnings. Later, Ohlson had developed the valuation model and accepted "*other information/non-accounting information*" as a control variable according to its encouragement of abnormal earnings.

This paper will begin with the following basic FO valuation model:

$$P_t = \beta_0 + \beta_1 BVA_t + \beta_2 BVL_t + \beta_3 AE_t + \omega^1 v^1 + \omega^2 v^2 + \varepsilon$$

Where:

$P_t$  = stock price at period t

$BVA_t$  = book value of assets at period t

$BVL_t$  = book value of liabilities at period t

$AE_t$  = abnormal earnings of period t

$v^1, v^2$  = other information

$\varepsilon$  = tolerance value

The above equation must be based on the following key assumptions:

1. The present value of expected future dividends determines the intrinsic firm value considering neutrality to the risk or a fair game.

$$P_t = \text{Present Value of all future dividends} - \text{PVED}$$

$$P_t = \sum_{\tau=1}^{\infty} R^{-\tau} E_t[\tilde{d}_{1+\tau}]$$

Where:

$$P_t = \text{market value of asset or stock price at year } t$$

$$\tilde{d}_{1+\tau} = \text{expected future dividend}$$

$$= \geq 0$$

$$R = \text{fixed expected return}$$

2. Clean profit or Clean Surplus Relation – CSR

The clean surplus concept derives from conservative accounting. It enforces the entries to retained earnings must be recorded only periodic earnings and dividends (Ota, 2002).

$$b_t = b_{t-1} + x_t - d_t$$

Where:

$$b_t = \text{book value of equity at period } t$$

$$x_t = \text{periodic profit for period } t$$

$$d_t = \text{dividend paid at period } t$$

3. Linear Information Dynamics or Linear Information Model

Linear Information Model explains the time-series behavior of the variables (Ota, 2002). In other words, the relationship of control variables must exist in a linear equation.

The development FO model emphasizes abnormal earnings as a variable that inspires the firm value. Abnormal earnings is estimated by the difference between the periodic profit and a return for the use of capital (Dahmash and Qabajeh, 2012)

$$x_t^a = x_t - r(y_{t-1})$$

Where:

$$x_t^a = \text{abnormal earnings for period } t$$

$$x_t = \text{periodic profit for period } t$$

$$r = \text{risk free rate}$$

# QUALITY-IMAGE OF STOCKS IN MAI AND JUDGMENT OF INVESTORS: EMPIRICAL EVIDENCE OF CG AND ROIC

$$y_{t-1} = \text{shareholders' equity at the beginning of the period}$$

The FO model relates a firm's market value to basic accounting data and “*other*” kinds of information. Such these relations are based on cross-sectional regressions in which earnings and book values serve as the primary independent variables (Ohlson and Liu, 1999). A critical issue addresses to the empirical studies is to incorporate “*other information*” into the model in order to explaining market values. This viewpoint indicates the idea that forecasting of future accounting data realizations depend on information beyond current accounting data. Hence such “*other information*” will also affect the market value in the same period of time.

From the above reviewing, FO model is well defined for the study of value relevance of QI of stock to stock price due to a simplicity framework. And this paper attempts to follow the idea of the empirical studies by putting the QI of stock, CG rating and ROIC, in the place of other information in the model.

## Population and Research Methodology

The research relies on inference statistical methods in the area of testing hypotheses. All calculations are analyzed in the regression program.

### *Population*

The data for the study were collected from 44 listed companies in MAI which their securities were first traded before 2008 and had reported and disclosed of financial information and others non-accounting information according to the regulations of the SET, continuously, through the year 2012.

### *The Model*

In order to find out whether investors use the QI of listed stocks in trading or not, the value relevance of the CG rating, ROIC, and stock price of the listed companies in MAI is investigated. Despite the core objective, this paper wants to strengthen the study to prove SEC believes in the influences of CG mechanisms, so, the FO model in equation (1) is applied.

$$P_t = \beta_0 + \beta_1 BVA_t + \beta_2 BVL_t + \beta_3 AE_t + \omega^1 v^1 + \omega^2 v^2 + \varepsilon \quad \dots\dots\dots (1)$$

Where:

$P_t$  = stock price at period t

$BVA_t$  = book value of assets at period t

$BVL_t$  = book value of liabilities at period t

$AE_t$  = abnormal earnings of period t

$v^1, v^2$  = other information

$\varepsilon$  = tolerance value

The equation (1) has been built within a framework where stock price appears as a dependent variable with contemporary accounting data and other data treated as explanatory variables (Ohlson, 1995). Moreover, it is designed to adopt a back to basic approach which relies on a measurement perspective. The highlights of FO valuation equation (1) is the “*other information*” variables,  $\nu^1$  and  $\nu^2$ , which are undefined and any expected variables can be substituted by way of linear relationship. And this paper defines the “*other information*” as QI of stocks in MAI, CG rating and ROIC.

Note that the core assumption required for all explanatory variables in the model is the clean surplus relation (CSR). For traditional accounting, the CSR ensures that all changes in the book value of equity are reported as either income (accounting earnings) or dividends. As a permission to be explanatory variables, CSR is the relation between current and next period’s data as linear and stationary, which is called Linear Information Dynamics relation (LIDOM). Consequently, the horizontally collected CG ratings and ROIC have to be tested for clean surplus relation, equation (2) (3), before plugging into FO valuation model.

$$CG_{t+1} = \gamma CG_t + \varepsilon \quad \dots\dots\dots (2)$$

Where:



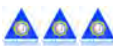
$CG_t$  = CG Rating for current period  
 $CG_{t+1}$  = CG Rating for the following period  
 $\varepsilon$  = tolerance value

$$ROIC_{t+1} = \gamma ROIC_t + \varepsilon \quad \dots\dots\dots (3)$$

Where:

$ROIC_t$  = ROIC for current period  
 $ROIC_{t+1}$  = ROIC for the following period  
 $\varepsilon$  = tolerance value

Somehow, applying CG rating to any expressions will cause a problem because the IOD and SET publish a volume of logo instead of CG scores and only, list of companies receive good CG rating and above are publicized. To be able to use in analysis, CG rating is decoded using 4-level rating scale, as follows, before putting into the place of “*other information*” variable in FO model.

4 = Excellent or   
3 = Very good or   
2 = Good or   
1 = Lower than good or no logo

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In fact, the range of CG scores for each classified group can be collected and for this reason, in case of testing clean surplus relation, a ceiling score of each group will be used instead of 4-level rating scale.

Eventually, a major issue related to variables application is the type of data being used in the FO model. Stock price, book value of asset, book value of liability, abnormal earning and ROIC are quantitative data but CG rating is qualitative data. To solve this problem, the basic equation is transformed into following equation (4) which is suitable for testing the value relevance of the QI of stock to the stock price of the listed companies in MAI.

$$P_t = \beta_0 + \beta_1 CG_{t-1} BVA_t + \beta_2 CG_{t-1} BVL_t + \beta_3 CG_{t-1} AE_t + \beta_4 CG_{t-1} + \beta_5 CG_{t-1} ROIC_t + \varepsilon$$

$$= \beta_0 + CG_{t-1} (\beta_1 BVA_t + \beta_2 BVL_t + \beta_3 AE_t) + \beta_4 CG_{t-1} + \beta_5 CG_{t-1} ROIC_t + \varepsilon \quad \dots\dots\dots (4)$$

## Variable Measurement

Table 1: Variable measurement and definition

Variable	Definition	Calculation and Measurement
$P_t$	Firm's value at period t	Market price per share at the end of period.
$BVA_t$	Firm's size at period t	Common logarithm of moving average of the book value of assets at the end of period.
$BVL_t$	Liability at period t	Common logarithm of moving average of the book value of liabilities at the end of period.
$AE_t$	Operating efficiency or abnormal earning at period t	The percentile ranks of abnormal earnings.  Abnormal earning is the difference between moving average of operating profit after tax and a return, at risk free rate, to the moving average of equity at the beginning of period.
$CG_{t-1}$	Corporate governance rating at the previous period  (Each year, after conducting research on CG, IOD and SET publish the results in November.)	FO valuation model- using 4-level rating scale instead of the volume of logo.  Testing clean surplus relation- a ceiling score of each group will be used instead of the volume of logo.
$ROIC_t$	Return on invested capital  At period t	A profitability ratio which is calculated by dividing moving average of after-tax operating income by moving average of book value of invested capital at the beginning of the period.

### *Hypotheses*

This paper conducts the test by replacing QI of stock, CG rating and ROIC, with other information in FO model as the explanatory variables. Therefore, both CG rating and ROIC have to be tested for CSR condition. Conclusively, the approach to answer this paper's question lies on 3 hypotheses:

H<sub>1</sub>: The relationship of CG rating meets the assumption of Clean Surplus Relation

H<sub>2</sub>: The relationship of ROIC meets the assumption of Clean Surplus Relation

H<sub>3</sub>: The value relevance of CG rating, ROIC, firm's size, liability, and abnormal earning to stock price must exist in a linear equation.

### **Empirical Results of the study**

Do the investors use Quality-Image (QI) of stocks, CG rating and ROIC, in trading capital stocks in MAI? This paper uses basic FO model as a tool to answer the research's question. And to keep with the main FO model concepts, 3 hypotheses must be tested and presented in series. First is the testing of CG rating condition using simple regression, second is the testing of ROIC condition using simple regression, third is the analyzing the linear relation of stock price and CG rating, ROIC along with the controlled variables in FO model.

*H<sub>1</sub>: The relationship of CG rating meets the assumption of Clean Surplus Relation*

Using simple regression to examine the relationship of CG rating during year 2008 to 2010, their results are reported in table 2.

Table 2: Simple regression analysis output-Significant level at 0.05 (n=44)

CG <sub>09</sub>				
<u>Independent variable</u>	Unstandardized Coefficient		<u>t</u>	<u>Sig.</u>
	<u>B</u>	<u>Stand. Error</u>		
constant	.831	.201	4.144	.000
CG <sub>08</sub>	.681	.110	6.188	.000
R <sup>2</sup> = .477		Std. Error of the Estimate = .511		F = 38.295
				Sig. = .000
CG <sub>10</sub>				
<u>Independent variable</u>	Unstandardized Coefficient		<u>t</u>	<u>Sig.</u>
	<u>B</u>	<u>Stand. Error</u>		
constant	.489	.216	2.263	.029
CG <sub>09</sub>	.868	.103	8.419	.000
R <sup>2</sup> = .628		Std. Error of the Estimate = .472		F = 70.884
				Sig. = .000

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As shown in table 2—with 95% confidence, the change in CG rating<sub>09</sub> can be explained by CG rating<sub>08</sub>, and the change in CG rating<sub>10</sub> can be explained by CG rating<sub>09</sub>. Moreover, the outcomes ( $R^2$ ) also indicate that the longer the IOD conveys its survey of CG the higher the power of the impact of current period CG to following period CG (t value and F value).

However, when testing for an existence of constant values (beta coefficient and t value) using Curve Fit, the predictions from equations without constants are better than equations with constants. Conclusively, the relationship of CG rating meets the assumption of Clean Surplus Relation and the null hypothesis is rejected. Remove constant values from equations, the expressions that prove the Clean Surplus Relation are as follows.

$$CG_{09} = 0.681CG_{08} \dots\dots\dots (2.1)$$

$$CG_{10} = 0.868CG_{09} \dots\dots\dots (2.2)$$

### *H<sub>2</sub>: The relationship of ROIC meets the assumption of Clean Surplus Relation*

Using simple regression to examine the relationship of ROIC during year 2009 to 2011, empirical results are reported in table 3.

Table 3: Simple regression analysis output-Significant level at 0.05 (n=44)

ROIC <sub>10</sub>				
<u>Independent variable</u>	Unstandardized Coefficient		<u>t</u>	<u>Sig.</u>
	<u>B</u>	<u>Stand. Error</u>		
constant	.004	.007	.497	.622
ROIC <sub>09</sub>	.963	.044	21.886	.000
R <sup>2</sup> = .919      Std. Error of the Estimate = .045400      F = 478.996      Sig. = .000				
ROIC <sub>11</sub>				
Independent variable	Unstandardized Coefficient		t	Sig.
	B	Stand. Error		
constant	.003	.010	.342	.734
ROIC <sub>10</sub>	1.012	.059	17.267	.000
R <sup>2</sup> = .877      Std. Error of the Estimate = .060716      F = 298.132      Sig. = .000				

As shown in table 3—with 95% confidence, the change in ROIC<sub>10</sub> can be explained by ROIC<sub>09</sub> and the change in ROIC<sub>11</sub> can be explained by ROIC<sub>10</sub>. And the outcomes indicate ( $R^2$ ) a deep impact of current period ROIC to the following period ROIC (t value and F value). However, this paper logically removes constant values from the ROIC linear equations because they barely have any impact to the model (beta coefficient). Accordingly,

the relationship of ROIC meets the assumption of Clean Surplus Relation and the null hypothesis is rejected. The expressions that prove the Clean Surplus Relation are as follows.

$$ROIC_{10} = 0.963 ROIC_{09} \dots\dots\dots (3.1)$$

$$ROIC_{11} = 1.012 ROIC_{10} \dots\dots\dots (3.2)$$

*H<sub>3</sub>: The value relevance of CG rating, ROIC, firm's size, liability, and abnormal earning to stock price must exist in a linear equation.*

As mention earlier that CG rating is qualitative data and such this type of data will cause a problem to exercise FO model. To solve the problem, this paper applies 4-level rating scale to the volume of logo and unavoidably, the control variables are adjusted and the following equation (3) is used to test the hypothesis.

$$P_t = \beta_0 + \beta_1 CG_{t-1} BVA_t + \beta_2 CG_{t-1} BVL_t + \beta_3 CG_{t-1} AE_t + \beta_4 CG_{t-1} + \beta_5 CG_{t-1} ROIC_t + \varepsilon \dots\dots\dots (4)$$

Using multiple regressions to analyze the value relevance of CG rating, ROIC, along with the controlled variables that mention in basic FO model; firm's size, liability, abnormal earning, to stock price, empirical results are reported in table 4.

Table 4: Multiple regressions analysis output-Significant level at 0.05

Year 2009 (n=44)				
Control variables	Unstandardized Coefficient		Collinearity Statistics	
	<u>B</u>	<u>Stand. Err.</u>	<u>Toler.</u>	<u>VIF</u>
constant	4.531	1.294		
Firm Size <sub>09</sub>	3.176	2.011	.003	314.317
Liability <sub>09</sub>	.496	1.032	.014	72.027
Abnormal Earning <sub>09</sub>	.036	.018	.181	5.510
CG <sub>08</sub>	-23.205	7.618	.008	125.327

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ROIC <sub>09</sub>	-3.385	3.868	.318	3.149	
R <sup>2</sup> = .422	Std. Err. of the Estimate = 3.158731		F = 5.552	Sig. = .001	DW = 1.530
Year 2010: remove 1 case due to high price volatility (n=43)					
<u>Control variables</u>	<u>Unstandardized Coefficient</u>		<u>Collinearity Statistics</u>		
	<u>B</u>	<u>Stand. Err.</u>	<u>Toler.</u>	<u>VIF</u>	
constant	2.116	1.772			
Firm Size <sub>10</sub>	3.745	1.826	.004		239.223
Liability <sub>10</sub>	-.633	.941	.016		61.005
Abnormal Earning <sub>10</sub>	-.009	.018	.175		5.712
CG <sub>09</sub>	-17.589	7.138	.011		93.229
ROIC <sub>10</sub>	4.921	3.947	.286		3.499
R <sup>2</sup> = .337	Std. Error of the Estimate = 3.306005		F = 3.754	Sig. = .008	DW = 1.287
Year 2011: remove 2 cases due to high price volatility (n=42)					
<u>Control variables</u>	<u>Unstandardized Coefficient</u>		<u>Collinearity Statistics</u>		
	<u>B</u>	<u>Stand. Err.</u>	<u>Toler.</u>	<u>VIF</u>	
constant	.669	1.898			
Firm Size <sub>11</sub>	4.170	1.618	.005		215.936
Liability <sub>11</sub>	-1.180	.982	.013		76.423
Abnormal earning <sub>11</sub>	-.011	.013	.225		4.450
CG <sub>10</sub>	-16.238	6.019	.013		77.594
ROIC <sub>11</sub>	.664	3.222	.284		3.518
R <sup>2</sup> = .324	Std. Error of the Estimate = 3.213841		F = 3.448	Sig. = .012	DW = 1.250

As shown in table 4— with 95% confidence, the change in stock price in each and every year, 2009-2011, can be explained by all control variables in FO model, and QI of stock, ROIC and CG rating. But the explaining powers of equations are not strong (R<sup>2</sup> and F value). When looking at the impact of each independent variable, there are 3 control variables that have strong effect to stock price (beta coefficient); firm size, ROIC and CG rating. Nonetheless, the model which comprises of all control variables shown in table 4 can explain the change in stock price, significantly.

Even though these outcomes have shown the significant correlation, still, there are signs of autocorrelation. To test the autocorrelation, Durbin-Watson values have been measured.

- 2009: when compare Durbin-Watson values to the critical value, the result cannot conclude whether there is an autocorrelation or not.

- 2010: when compare Durbin-Watson values to the critical value, the result shows no autocorrelation.
- 2011: when compare Durbin-Watson values to the critical value, the result shows no autocorrelation.

Thereby, the findings have proved that the value relevance of CG rating, ROIC, firm's size, liability, and abnormal earning to stock price exist in a linear equation. So, the null hypothesis is rejected. The followings are expression of 2009, 2010, and 2011.

$$P_{09} = 4.531(+/-3.1587) + 3.176BVA_{09} + 0.496BVL_{09} + 0.036AE_{09} - 23.205CG_{08} - 3.385ROIC_{09} \dots\dots\dots (4.1)$$

$$P_{10} = 2.116(+/-3.3060) + 3.745BVA_{10} - 0.633BVL_{10} - 0.009AE_{10} - 17.589CG_{09} + 4.921ROIC_{10} \dots\dots\dots (4.2)$$

$$P_{11} = 0.669(+/-3.2138) + 4.170BVA_{11} - 1.180BVL_{11} - 0.011AE_{11} - 16.238CG_{10} + 0.664ROIC_{11} \dots\dots\dots (4.3)$$

## Conclusion and Implication

Substituting the QI of stock, CG rating and ROIC, to other information, this paper has applied the FO model to test the value relevance of QI of stock to stock price of listed companies in MAI. And with requirement of the model, QI of stock has to pass the test of Clean Surplus Relation. Moreover, this model is a predictive model that emphasizes on growth, so, all variables shall have positive correlation, especially, other information which is used by investors to make a prediction about future earnings (Liu, J. and Ohlson, J., 2000).

From the hypotheses testing, the outcomes show that--(1) External QI, CG rating and internal QI, ROIC, have met Clean Surplus Relation condition, and (2) the value relevance of CG rating, ROIC, firm's size, liability, and abnormal earning to stock price exist in a linear equation. Even though the null hypotheses are rejected, there are some ambiguous matters from the findings-- firstly, FO framework on positive correlation has not been followed and secondly, the explanatory power of the models is weak.

Control variables in the model that show negative correlations are CG rating, abnormal earning and liability. As for CG Rating, the external QI, which showed strong negative relationship, this paper implied that at the time the population were studied, investors did not pay attention to the CG rating and did not use such information for decision making. This paper's finding had the similar outcome as the study of Bauer et al. (2004) which showed a negative relationship between governance standards and corporate performance and claimed that their result reported evidence of insignificant relationship between these two variables. In fact, a ratio of listed stocks given symbols of good CG rating and above by SET did push the attitude of investors to ignore CG scores. Because the ratios of listed stocks received CG scores more than 79/Good were only 25% and 36% in 2009 and 2010 respectively. Supportive evidence came from a study of Hodgson, Lhaopadchan and Buakes (2011), they found that the Thai main stock market had a slow learning adjustment to the governance index because of uncertainty as to information content. Hence, the governance information content in Thailand was not (initially) fully integrated into prices.

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Other control variables that break FO framework are liability and abnormal earning. It appears that liability and abnormal earning have unsystematic signs. In case of liability, the negative beta coefficient showed that during 2008-2011, liability might not be relevant to determine the firm's value and its operating results in the future (Modigliani and Miller, 1958) because Thailand had economic downturned and that caused abnormality to the capital market. Especially, interest expense could be tax credit (Modigliani and Miller, 1963). Likewise for abnormal earning, negative beta coefficient showed its irrelevance to determining the firm's value at the time of the study because of economic downturn and abnormality of the market. However, there's another view from Giner and Inoguez (2006) to considering the sign of abnormal earning. They suggested a segregation of abnormal earnings in term of sign in the study to prevent the power of negative sign in calculation. Actually, this paper put abnormal earnings in FO model without segregation them in term of sign as they had transformed into percentile ranks in order to solve the problem of the negative sign. So, the regression equations may have the effect of negative abnormal earnings. Giner and Inoguez (2006) state that the investors interpret negative abnormal earnings difference from positive abnormal earnings because of 2 reasons – (1) Investors do not consider the negative abnormal earnings in their calculations because they hope to solve the current problems of firm and future profitability in their calculations, and (2) loss making firms during winding-up are often valued under liquidation option and, therefore, the least return of investment in firms' shares is fixed and the current losses have no effect thereon. And if the negative abnormal earnings are temporary, the coefficient of these earnings should be significant and close to zero. The conclusions of Giner and Inoguez make more sense for the findings of this paper because virtually, the beta coefficients of abnormal earning in all equations show no value.

The second issue is the explanatory power of the models. During 2008-2011, the investors' decision to weigh the risks with the benefits received would be different from normal capital market due to the economic downturn and the abnormality of the capital market. Such as in 1960s which economy was in recession and capital market was not in a normal condition, the study of Fama (1965) found that investors hardly used past stock price to forecast returns in the very near future and (Fama, et al., 1969) one could be affected by the changes very easy. Supporting by the work of Markowitz (1952) about investors' behavior, securities could not be evaluated in isolation, but only as a group. So, the decision to hold any security would depend on what other securities the investors wanted to hold. And very often, the deviations in asset prices were from unreasonable investors. Such events could occur during the studied period of this paper and of course, the ability of the model to explain the change in the stock price was probably less than 50%.

Concerning the discussion and conclusion, finally, this paper has shown the evidence that the FO model can be used to find the value relevance of QI of stocks and stock prices. Moreover, the external and internal QI of stocks together with control variables of the model can synergistically explain the change in stock prices with significance although some variables have broken FO framework on positive correlation. However, those variables that broken FO framework, in fact, rather reflect the investors' judgment during economic downturn. And when comparing the beta coefficient of the two QI in equations, they initially indicate investors' sign of a slight belief in external QI more than internal QI.

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# THE MODERN LABOR MARKET AND ITS AFFINITY TO POVERTY ON THE EXAMPLE OF THE AUSTRIAN WELFARE STATE

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**Abstract.** *Recent years have been marked by a proliferation of new labor market structures – a significantly growing fraction of the labor force consists of atypical or precarious employed, unemployed or underemployed in the sense that they are unable to work as much as they prefer. Yet, it seems as there is no consensus among scholars about whether atypical employment is an alerting signal or defined as “normal” working conditions. However, detailed analyzes beyond labor market structures such as the role and coherence of labor markets with modern economics and their uncountable excesses, implies obvious alerting signals of atypical employment. The tangibility of their societal and entire impacts is relatively low and difficult to measure. Poverty, deprivation, social exclusion or societal de-collectivization are directly or partly measurable consequences, whose accumulation with other (new) societal and economic challenges leads to a totally new situation whose tangibility is once again even more hardly comprehensible. Economists and sociologists such as Castel (2011), Löwy (2005), Wichterich (2011) or Michalitsch (2011) emphasize the complexity of such consequences and the weakening of the societal fundamentals by contemporary labor market policies and structures, which threatens the fundament of the entire global economy.*

## Introduction

The contemporary form of global capitalism experienced a vast of social, political and economic upheavals occasionally in positive directions such as the collapse of the planned economy, the increasingly supranational coordination and thus more intensified economic linkage or the economic global extension through the emerging markets (Michalitsch 2006). Even though, the 2007-09 financial crises and the resulting great recession lead to the increasingly obvious dysfunctional form of capitalism (Stiglitz 2013, 23), which currently faces the deepest crises since the Second World War without real signs of long-term improvements. The societal subsystems economy and financial markets increasingly affect and determine modern societies with their own logics of gambling, economic growths and profit maximization at any price. These forms of logic exist beyond the reality and orientations of societies with the results of distorting them (Seckauer and Weidenholzer 2014). The politic-economic framework is dominated by the belief in the economic rationality – “*the neoliberal doctrine of salvation*”. This form of salvation extols the institution of “*the market*” above the state, its politics including the societal and political alignment towards the insatiable quest for profits, the productivist and mercantile logic of capitalism (Löwy 2011).

The labor market is a key figure in the economics, politics and societies in terms of the redistribution of capital as well as in generating economic stabilities and consequently of mitigating and enhancing financial and economic crises. Furthermore, the labor market is an important tool for generating wealth within societies and their members. Assumptions

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such as that full-employment guarantees wealth within one national economy and economic growth of at least two percent stabilizes and decreases unemployment rates lose their relevance, because the labor market as well as other economic structures faces fundamental realignments within the previous decades. The modern labor market is characterized by the continuous replacement of formal and standard job arrangements by informal and atypical job arrangements and thus the fear appears that the labor market is another tool or way, which enhances the capital shift from the bottom to the top of society. In Austria, the number of full-time standard employment decreased between 2012 and 2013 by 1.5 percent whereas the atypical employment increased by 3.4 percent (Knittler 2013; Statistik Austria 2014c) in consideration that atypical employment is often characterized by precarious working conditions (Castel 2011; Wichterich 2011; Sommer; 2010; Bosch 2012; Brinkmann et. al 2006) and already has got an share of one fourth of the Austrian labor market (Geisberger and Knittler 2010).

The resulting societal circumstances are very complex respectively far-reaching from ecological impacts over exorbitant income or wealth gaps, which imply societal divisions, de-collectivization, mass-unemployment, deprivation, high poverty rates to fundamental individual issues including psychosomatic disturbances, depressions or loss of perspectives (e.g. Butterwegge 2009; Michalitsch 2006; Castel 2011; Wichterich 2011). However, this subject matter enjoys different societal values including the kind of an ignorance of numerous aspects such as developments in the financial market, ecology, societal tensions between the economy and society, wealth gap issues and numerous other societal and individual aspects. A more detailed perspective indicates a dramatically stage of the excesses in terms of labor market related crisis, for instance, including assumption of at least twice as high unemployment rates, risk of poverty rates as shown in the official statistics, the crisis of gainful employment and unknown magnitudes of precarious and working-poor conditions. Economists and sociologists such as Castel (2011), Wichterich (2011) or Michalitsch (2011) emphasize the complexity of these consequences and the weakening of societal fundamentals by contemporary labor market policies and structures, which threaten the fundament of the entire global economy.

### **The global Wheel**

The structures and alignment of the contemporary global economy are only partly tangible in their excesses occasionally in western societies, in which they obtain continuously greater and more complex dimensions – e.g. inequality and wealth gaps. The United States as the capitalistic hegemonic nation is as well an extraordinary example of the growth and magnitude of the societal gaps. The American population was once divided into one third and two third and further into 80 percent poor or average versus 20 percent rich in the second half of the 20<sup>th</sup> century. This division developed into the extreme of the *one versus 99 percent* society. In 2007, the top percent earned on average \$ 1.3 million in contrast to the bottom 20 percent with an average annual income of \$ 17,800. The top one percent earned around 40 percent more in one week than the bottom fifth in a year and the top 0.1 percent earned the same amount in one and a half days as the bottom 90 percent in a year together. Even shortly after the previous financial crisis in 2008 the disparity grew enormously, as between 2009 and 2010, 93 percent of the additional income went to the top one percent. The income rates of the majority remained either equal or even dropped within the previous decades. During the crisis of 2008/09, top-managers defended their wages remarkably well and received additional bonuses for releasing some of the work force in order to max-

imize profits by reducing personnel expenditures. Around 57 percent of capital incomes shift to the top one percent of wage earners in the US (Stiglitz 2013, 25 f.). The societal gap is even more tangible in terms of ownership – in the US the one percent owned more than one third of the entire national wealth in 2007. Even after the stock crash the top one percent owned 225 times more than the average American citizen. Similar to the period before the economic crisis in the 1930s, the current exorbitant magnitude of the societal inequality leads to threatening economic and societal instabilities (Stiglitz 2013, 26 f.).

Austria as the third richest country in the EU and the 7<sup>th</sup> or 12<sup>th</sup> richest country worldwide faces alarming dimensions of income and property gaps. The bottom tenth in terms of income earned maximum 11,630 Euro annually compared to at least 39,379 Euro of the top income tenth. The top five percent of households possess nearly half of the entire gross national wealth, whereas the *bottom half* does not even have four percent at its disposal. The bottom half dispose on average over 11,000 Euros in contrast to the top five percent with a median net wealth of € 1.7 million (Fabris 2014).

#### *The realignment of capitalism since the 1980s*

In general, the belief of the economic rationality – “*the neoliberal doctrine of salvation*” – shapes the contemporary politic-economic framework, which has established itself respectively developed from the edge to a central hegemonies position after the eroding classical liberalism. Since the 1970s the neoliberal doctrine of salvation extols the institution of the market above state, politics and the overall society (Michalitsch 2006, 48 f.). A political, economic and ideological realignment initiated in western industrialized economies, because of the apparent failure of nation states to regulate the economy, which the economic crises of the 1970s and 1980s have proven. Neoliberal proponents refer to the illusion that government measures lead to the meant economic effects, because such interferences led apparently to opposite results – instead of increasing employment figures emerge higher structural unemployment or instead of anticyclical economic management, pro-cyclical impacts on economic booms and downturns (Willke 2003, 84 f.).

According to Butterwegge (2009, 96-106), neoliberal economic structures occurred before the global economic realignment of the 1970s. The Minister of Economics of the former BRD Ludwig Erhard, for instance, emphasized to guarantee full-employment and maximize private wealth through continuous economic growth without the requirement of the welfare redistribution but with the focus on private initiatives, self-responsibility and self-provision. Ludwig Erhard criticized the Bismarckian welfare state including the labor compulsory insurance, because a social security system would destroy the national economy as it represents a contradiction to economic liberty and would encourage inflation. Due to the economic competition between the planned economy and market economy after the Second World War, West Germany realized certain social benefits such as pension benefits, because capitalism may underline once more its advance in contrast to the planned economy (Butterwegge 2009, 96-106).

The roots of liberal concepts of reforming societies and of creating a neoliberal dominated politic-economic structure traces back to the first third of the 20<sup>th</sup> century – in 1938 the journalist Walter Lippmann founded *The Good Society* foundation. In 1947, the founding of the *Mont-Pèlerin Society* initiated the crusade against the “Marxist and Keynesian totalitarianism” with the aim of promoting the self-regulating market. The subsequent arising international network of foundations, institutions, research centers, public-

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relations agencies, scientists and authors promote incessantly neoliberal ideologies. In the United Kingdom the breakthrough was with Thatcherite policies backed by the Adam-Smith institute and in the United States with the Reagan era, which was heavily supported in the field of the economic science by the Heritage-Foundation in the late 1980s. The breakthrough of economics as a science refers to the awarding of Nobel Prizes for economics, which is endowed by the Swedish national bank to commemorate the Swedish chemist Alfred Nobel because Nobel Prizes were initially only awarded in fields of sciences such as physics, chemistry or medicine. Since 1969, numerous neoliberal economists were awarded with a Nobel Prize, e.g. Samuelson in 1970, Hicks and Arrow in 1972, Hayek in 1974, Friedman in 1976 and Becker in 1992. In this respect, the *Mont-Pèlerin Society* was an important network, as seven of its members received a Nobel Price between 1974 and 1992 (Michalitsch 2006, 49 f.).

### *The modern state*

The “neoliberal era” of capitalism implies the replacement of national economic monopolies by multinational organizations in terms of the economic and social sovereignty. The forced withdrawal of nation states strengthens the overall position and role of the market, which continuously takes over more social competences including the distribution of incomes, for instance. The Keynesian welfare state, which regulated and reallocated the excesses of markets, is continuously replaced by the market forces subordinating competition state which cares for a minimum of social cohesion and management of political conflicts (Michalitsch 2006, 52 f.). The neoliberal ideology represents a late-capitalistic form, which is determined by the stigma of market-economic attitudes following the principles of competition, maximization of profits, performance principles, profitability, deregulation, flexibilization, avoidance of justice, capital and financial markets, globalization, international and multinational organizations and competition between states, individuals, societies and economies (Willke 2003, 84 f.). The erosion of national states characterizes in terms of the hegemonic shift towards global players the precondition as well as the consequence of this politic-economic realignment (Michalitsch 2006, 52-54).

The role of organizations and of the entrepreneurial spirit increases its societal importance. In this respect, the supply-economy model – the *substantial role of the entrepreneurship and organizations* – in modern economics is an important factor in the politic-economic realignment. According to Michalitsch (2006, 75 f.) proponents of the supply-economy refer to the correlation between higher individual performance commitment and increased production, growth and employment through additional income and thus additional consumption. According to their point of view the role of entrepreneurship and the development and promotion of entrepreneurial thoughts and actions get priority, because of its impacts on economic growth as entrepreneurs create new markets and needs by launching new products, services and goods. Michalitsch (2006, 75 f.) also refers to the model of Joseph Schumpeter, who defines the Entrepreneurs as the “revolutionaries of economics” because the innovative pioneer-entrepreneur creates new goods and thus new markets which tend to be driven less by ideas or inventions but more by the pressure of competition. Neoliberal proponents emphasize the important role of investment activities of entrepreneurs in terms of economic growth and the supply-economic model refers to the enlargement of entrepreneurial leeway by minimizing the obstructions from labor representatives and governmental interventions, because a weakening of labor unions enforces the “moderation” of income rates, policies regarding worker protection or environmental compatibility (Michalitsch 2006, 75 f.).

However, neoliberal proponents emphasize the importance of the state in the contemporary politic-economic structure. According to Willke (2003, 84 f.), Milton Friedman defines the nation state as a kind of referee who determines and supervises economic rules. Neoliberal proponents define the duty of nation states to focus on the fields of their true competences instead of causing governmental failures through misguided economic interventions. Economic growth and employment requires a low regulation and low economic burden for the economic subjects and organizations, because too much state in the form of taxes and contributions would limit the flexibility for economic maneuvering of markets and individuals. A limited degree of intervention at the national level would enable full-employment and is seen as the best form of welfare politics, which should emerge from the market instead of Keynesian principles. The task of the market is to create frameworks in which its economic subjects may follow its targets independently. Nation states are required to civilize market activities, ensuring legal peace, ownership, the compliance of private contracts and contractual freedom. Furthermore, nation states are required to take on duties which would be too difficult or expensive for individuals or areas in which the market only functions partially or not at all (Willke 2003, 86 f.).

The legitimation power within politic-institutional structures and of governments shift, as the executive enjoys higher priority at the expenses of parliamentary institutions, for instance. Ministries with intra-societal orientations, which are responsible for labor, education, social and cultural affairs, lose autonomy continuously; in contrast to world-market-oriented ministries such as finance, economy, technology and science which define new priorities. In addition, the significance of less legitimized institutions such as the European Central Bank or the media increases, whereby social integrative organizations such as labor unions and parliaments are continuously undermined. Economic and social competences become more frequently a duty of the market, international independent institutions or individuals. The European project of integration appears as an example of depoliticization of the economy and the reconstruction of welfare to competition states, as economic and social functions and competences drift towards markets and from political pressure protected international institutions which enhance the supranational coordination of national political areas and the intensified involvement of private stakeholders. Finally, governmental interventions against markets are undermined through authority-repressive forms of regulations and disunited ideologies (Michalitsch 2006, 53 f.).

Willke (2003) refers to the arising tensions through the economy as a societal partial system for society, because of its own logic and the magnitude of the functional differences, which leads to a ruthless behavior at the costs of entire societies. This leads to a permanent voltage ratio between the requirements of the society and the differed interests of the subsystem economy. The task of the nation states is to mitigate these tensions to secure law and order in case of arising unacceptable dimensions of such tensions (Willke 2003, 88). Neoliberal proponents demand a slim welfare state, whose savings partly move to additional costs of the security state (Castell 2011; Dehnhard 1999 1-25). The role of security measures increase significantly in western societies within the previous past as well as their expenses such as the installation and maintenance of the nearly six million closed-circuit television cameras in London, for instance (Barrett 2010).

Moreover, modern states are characterized by another neoliberal foundation pillar – privatization (Zerowsky 2005, 15; Michalitsch 2006), whose target is to hand off national duties and properties to the responsibility and authority of private enterprises or households

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(Michalitsch 2006). Privatization is according to neoliberal proponents for a well-functioning market important, because national organization would distort competition and hold unjustified monopoly positions such as in the education or health sector. Any societal sector should be market-based organized that the few and small market failures are easier solved with market regulated institutions (Zerowsky 2005, 16). Consequences of these shifts are that existential societal concerns are continuously managed by “private” instances, which operate without societal responsibilities, undermine national legislatures and reduce the scope of influences and participation possibilities for labor unions, welfare institutions as well as the population. The possibility for the political participation of the population through democratic institutions gets more difficult and is not required. Neoliberalism enhances the “anti-political versions of politics” (Michalitsch 2006, 53 f.).

### *The domestic individual*

The extension of market mechanisms and logics to the entire *society* and the emergence of judicial policies enabling unlimited competition and the potentials of self-organizing collective life are desired features of the contemporary form of capitalism. Economics transformed into political and societal projects, as from Lippmann to Thatcher’s famous paroles “*Economics are the method, but the object is to change the soul*”. People need to be adapted to a world of generalized competition (Hilgers 2012, 80-91). This form of competition between individuals exceeds economic aspects, as members of western societies face every day the competition about societal status, privileges, occupations, friendships, monetary distributions and the allocation of scarce resources in general.

The contemporary competitive form of capitalism is characterized by the economization of the individuals into entrepreneurs. The welfare state coverage gets systematically substituted by the increasingly important, economic and new role of individuals. Societal issues are no longer hidden but are converted from collective into individual issues such as unemployment refers to the lack of motivation instead of economic structures. Furthermore according to neoliberal proponents, the inequality as a measure of equity converts to a positive phenomenon, because it stimulates the commitment to performance. Social justice is not any longer required and replaced by competition in order to enhance private initiatives and the commitment to performance. The economic competition is seen as a precondition for entrepreneurial thinking or acting of individuals as well as organizations and thus it is seen as an important factor for the current capitalistic system and its requirement of economic growth (Michalitsch 2006, 88 f.).

According to Michalitsch (2006, 88f.) Gary S. Becker is a proponent of the universalization of economics including the subjugation of all areas of life under the logic of the economic optimization and individual utility maximization. The rational cost-benefit calculation shapes the foundation of human behavior in terms of conscious decisions or (strong) emotions. Family, marriage, the number of children, criminality and politics convert to objects of economic analyzes. The marriage defines Becker, for instance, as a two-person company with the objective of producing children. Individuals invest into themselves depending on expecting profitability – the monetary and physically return on investments. The investments into human capital include apart from education and On-the-Job-Training, the improvements of emotional and physical health. Individuals are considered as economic units with the alignment of the entire existence to the economy beyond the consumption factor and labor market participation. The individual can be considered as an entrepreneur following the logics of the market including any monetary possibility and self-reliance in

terms of having the willingness for performance in order to achieve monetary wealth instead of requiring social structures (Michalitsch 2006, 89-91).

### *Behind the curtains*

The American economist, Nobel Prize winner in economic science in 2001, former senior vice president and chief economist of the World Bank and former Chairman of the Council of Economic Advisers Joseph Stiglitz (2013, 183-233) emphasizes in his literature several times diverse forms of conviction of the richest percent beyond monetary dimensions in order to make society believe to share the same interests, which are in reality not only those of the elite, but even contradict those of the other 99 percent. The economist emphasizes the successful shape of the public perception which is testified by the malleability of beliefs beyond collective perception. The beliefs and perceptions about social values of fairness and efficiency, the strengths and weaknesses of markets or governments and as mentioned above about key social issues such as inequality or poverty have been successfully shaped by a handful of individuals. Multinational organizations significantly benefit out of advances in psychology and economics which enlarge the understanding about the shape and alignments of preferences, perception and beliefs as well as of inducing individuals to consumption and finally living unpleasant lifestyles. The access to information, knowledge, tools as well as resources for shaping perceptions, beliefs and thus preferences grows continuously. Perceptions of both individuals and societies play an essential role in modern economics and contemporary hegemonial capitalistic structures, because they shape the global reality. In this context, Stiglitz (2013, 183-233) refers to the underestimation or overestimation of economic and social key figures by many, or more likely by the majority of the western societies. The situation of inequality including its effects on political, societal and economic affairs, for instance, is underestimated as well as the governmental expenditures of measurements against inequalities are overestimated. These forms of perception are driven by certain groups of interests – the richest percent broadens its interests through politics and other societal fields and institutions to the other 99 percent. Consequently, major parts of the reality of the broad mass of industrialized societies are driven by a small powerful societal group. The inequality rate as one social and economic indicator affects, for instance, significantly political and economic affairs and policies such as the alignment of investments on financial markets (Stiglitz 2013, 183-233).

The political and economic policies endeavor for the interests of the richest percent of society. Modern politics are characterized beyond the mobilization and battle of obtaining voters, through discouraging those to vote who would certainly not vote the own party, because of the different interests, for instance. It refers to the mindset of the past, when the voting franchise was heavily restricted, in times of the census voting right. In both cases, elites feared to lose their power, wealth and privileges by a broad voting behavior (Stiglitz 2013, 183-233). The dwindling middle class implies in a way the hollowing out of political voting, because the middle class is seen as the backbone of the western democracy, because the poor tend to be alienated to politics and thus are less likely interested in voting and in contrast the rich who shape laws according their interests and thus do not support democratic principles. Although the middle class understands most likely the importance of voting in a democracy as well as the fair configuration of law is necessary for the economy and society, the middle class itself is disillusioned with politics that obviously not serve their needs and interests as societal members and voters (Stiglitz 2013, 148-182).

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Another very important issue within modern politics and economics is the collective significance of and dealing with knowledge, information and education – the marketplace of ideas, which is perceived as distorted. Objective decisions of voters are based on the access to the requisite information. Apart from the assumption of a biased media, citizens of western societies are coined of the perception that the disclosed information of their governments might not be. However, the western societies are far away from truly competitive media. The compliance of competitive policies, strengthen policing of antitrust laws and the more intensive vigilance about attempting control of newspapers, TV and radios by media corporations in combination with a public support for diversity would defuse the situation enormously. The impact of the media in western societies exceeds the advertising market – the entire market of ideas is concerned. A well informed public with an active and diverse media is the fundament for a well-functioning democracy in any dimension. Josef Stiglitz emphasizes that the media is currently in the upper hand of the one percent. Similar to political investments, these investments yield higher private returns than others also beyond monetary dimensions (Stiglitz 2013, 148-182).

### *The Impacts on the labor market*

Societies and their individuals align their overall situations to the universal economic concept. A collective indignation is shared about the human turpitude within the market system whose merciless competition is driven by pure egoism and profit seeking. The repulsive materialistic lifestyle, which is demanded and practiced in the market economy, enhances the criminal ambition for self-interestedness in form of materialistic pleasure (Willke 2003).

The contemporary form of capitalism is characterized through globalization, which shapes modern societies, their national economies and individual life courses enhanced by the fall of the iron curtain and the arising Asian emerging markets. The emergence of a single worldwide market led to an intensified global competition with the effect, that larger international connected markets spawn more international specialization of labor and transform traditional industries and occupational frameworks significantly faster. Consequently, the possibility of market turbulences, the volatility of economic developments and the rate of technological progress in the (global) economy has significantly increased, because of the intensified linkage between (financial) markets. Furthermore, the increasing mobility of production factors beyond national borders, in particular within the financial market, lead to rising business tax competition among nation states and governments, which get increasingly under pressure to deregulate, privatize and liberalize their economies structures and policies or even transfer economic responsibilities to markets (Buchholz et. al 2011, 3-24).

The basic idea of trade globalization is to substitute the movements of people by the movement of goods around the world. Austria as a developed nation, for instance, imports by unskilled workers produced goods from abroad, which leads to the declining demand in this labor sector in Austria by the amount of workers needed to produce the imported goods. Consequently, income rates of unskilled workers decrease, because of their decreasing demand. Austrian workers need to compete by accepting lower wages or poorer working conditions. This effect of globalization would develop independent of the globalized framework policies, as long as the international trade increases. However, global policies and structures aggravate wage underbidding and international labor market competitions, because they hollow out the workers' bargaining power. Due to the conditions of low tariffs between the nations and high capital mobility, organizations simply argue in front of their employees that in terms of neglecting lower wages or worse working conditions the

production site or the entire company “needs” to move to other locations with lower income rates and employment standards. In order to emphasize the consequences of asymmetric globalization policies in terms of the bargaining power, contrary global policies, which imply free mobility of labor force and in contrast no mobility of capital would significantly change global business affairs. Countries would attract their workers in order to acquire capital. Locations would be promoted with good schools, healthy and well-functioning environments and even low taxes on their wages. Nations would finance their wealth and these structures through higher taxation on capital. In the reality, the one percent is not interested in such conditions and thus the other 99 percent follow the necessity in believing to share the same interests (Stiglitz 2013, 60-82).

Moreover, after national governments successfully confirmed global policies, corporations enhance their bargaining power against governments in order to demand lower tax duties and regulations. Organizations do not only threaten their employees but also entire nations to remove their production sites or headquarters in case their taxes would not decrease. The US-corporation Nike relocated, for instance, its production to Indonesia. The organization employs mainly young women or female teenagers for a minimum wage of under the national settled minimum wage. The production of one pair of shoes costs just \$ 0.12 compared to the final selling price of at least \$ 88 (Afheldt 2005, 175). Furthermore, the multinational cooperation Medtronic transferred its corporate headquarters to Ireland, because of the lower income taxes of 12.5 percent instead of 35 percent in the US (Thieme KG 2014). Consequently, western countries face an enrichment of their organizations at the expenses of their employees and even entire societies.

However, the promotion of globalization refers to that all will benefit and witness wealth. This contention is built on two fundamental arguments. Globalization increases the GDP and leads to the automatic trickle-down effects of the increased GDP which ensures the distribution of the wealth to the entire society. Meanwhile, experiences prove that neither any argument has established itself. In case of well-functioning markets free trade would allow people to move from protected and (potentially) less profitable sectors to more efficient unprotected export sectors – which *might* result in an increase in the GDP. As unemployment rates in western societies illustrate, markets are often not working according to this theory (Stiglitz 2013, 60-82).

Mainstream economists argue that the annual economic growth of at least two percent is necessary to create new jobs, increase the wealth and reduce unemployment rates. The recent past showed that although the unemployment rate decreased from 11.3 percent in July 2005 to 8.1 percent in January 2008 in Germany for instance, the continuous shift of the wealth from the bottom to the top, however, advanced. Germany recorded in this period an economic boom with an annual economic growth of up to seven percent (Halver 2014). The net income rates of German employees decreased within the same period and was in 2007/08 five percent lower than in 2000 (adjusted for inflation) (Querschuesse 2011).

Finally, the alignment of tax policies in western societies significantly influences the competition factor of entire nation states and their economies. The labor taxation in Austria, for instance, increases the wage gap with other emerging and developing countries in terms of labor force expenses and thus aggravates the international competitive position of the Austrian economy. In this context, the vulnerability of the Austrian SMEs is significantly higher, because of their higher alignment to Austria as far as their occupational

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structure is concerned, compared to multinational organizations. These firms pay the majority of their business taxes such as labor taxes, revenue taxes and corporate income taxes in Austria. In the IT-sector for instance, an Austrian average programmer costs at least 4,000 to 5,000 Euros per month for five days and 40 hours week compared to an Indian programmer who costs including all additional costs in average between 300 to 700 Euros for longer working hours and barely any work protections, and even though the work is done as well for an Austrian multinational corporation. Forms of labor taxation in Europe<sup>1</sup> aggravates significantly the international labor market competition and additionally the power shifts away from the societies, SMEs<sup>2</sup> and national economies towards multinational corporations. A shift of the business taxation focus from labor force to capital flows would increase enormously governmental incomes, mitigate international labor competition factors and enhance the monetary position of the broad labor force in western societies.

The modern life focuses on different values and kinds of neglects such contradictions against the capitalistic sovereignty, which is shaped after the unrelenting logic and dynamic of the unlimited accumulation and circulation of capital. The capitalistic ethos of production leans on economic growth, competition and maximization of profits and thus leans on the basic interconnected principles of *growth* and *acceleration*. Capitalistic societies share the point of view that every imaginable process must be done in order to boost economic growth – to increase incessantly its GDP, not because the contemporary level of wealth is not enough, more likely because it prevents the collapse of the capitalistic system. Furthermore, societies accelerate their individual and collective lifestyles not because the former was to slowly, more likely because it is the precondition to remain in the global competition. The resulting growth compulsion detaches from material needs. The increasing production curve is based on previous economic growths and thus an almost exponentially curve. Capitalistic subjects get forced to increase their production, consumption and the overall capital circulation independent of how this increase might be achieved, but certainly with a lower value of the individual joy of the added value. Economic growth and acceleration of modern life increase reciprocally with each other – *time is money*. Time in form of working hours represents a production factor and thus time saving leads to competitive advantages – higher outputs per working hour. Consequently, western societies face faster turnover of capital and thus the speed of production, circulation of goods and consumption, which is similar to the economic growth an indispensable feature of capitalistic economies (Rosa 2009, 87-125).

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<sup>1</sup> Labor taxation as well as the sales tax enhances a form of tax structure which favors the rich at costs of the poor. The corporate tax in Germany for instance dropped from 53 percent to 15 percent at the beginning of this century. In addition, Helmut Kohl abolished the stock exchange tax in Germany. On the contrary, the sale tax in Germany rose from 16 to 19 percent. This tax and the income tax need to be paid by every citizen including the individuals living close to the poverty threshold or below.

<sup>2</sup> In 2013, the Small and medium enterprises (in this case enterprises with up to 249 employees) employed in Austria 60.5 percent of the Austrian employed population and thus possess an important role in labor market and economy (WKO 2013).

## **The labor market in a modern capitalistic society**

Brinkmann et al. (2006) describes the major reasons for the contemporary labor market developments in the new dispersed complex politic-economic structures, which is maximal enhanced by collectively known reasons such as the transition of the modern society into a postindustrial service society or the feminization of employment. Forms of capital-accumulation not only include the accretion of investments funds or capacities of production but also the extension of private-capitalistic relations of production to undeveloped regions and societal areas, realized by the power of focal corporations over their suppliers, subcontractors and purchaser as well as flexibilization and casualization of labor forces. Brinkmann et al. (2006) refer to one of the key points that economic dynamics are significantly encouraged through deregulation, flexibilization and casualization of labor markets. Financial markets obtain central economic significances in terms of the determination of investment alignments, for instance. Global financial and economic players are motivated to fulfill fundamental changes within the system of corporate governance which influences the merges of corporations, the reorganization of enterprises and the management of consumption. The tensions between the economy as a subsystem and its overall system the society need to get mitigated apart from the nation states by adopted labor market force – whose working conditions serve as grease for the economic and financial excesses. Thus flexible and cheap labor developed from the consequence of the contemporary capitalism to the precondition of its existence (Brinkmann et al. 2006).

### *The shift of the labor market equilibrium*

The term *labor market* refers to principles of market mechanisms which are based on equilibriums between demand and supply – voluntary contractual agreements between employers and employees with agreeable labor conditions for both parties. Since the previous decades western labor markets face a shift of the negotiating power towards employers, due to global and economic policies, which is an important strategy in terms of spreading poor and precarious working conditions, with the purpose of profit maximization for employers, corporations, their shareholders and owners at the cost of the broad labor force and society.

The bargaining power shift within the labor market refers to a constantly increasing labor supply versus a continuously decreasing labor demand. Declining labor force demands in Austria and other developed nations are significantly shaped by automatization of economic processes since the initiating industrial revolution. Automation engineering replaces step by step human work force and decouples productivity and human effort, because of the increasing productivity and working periods. Automated systems enable revolutionizing features in modern economics that the realignment of productivity by the temporal decoupling of human and mechanic productivity (de Gruyter 1993) which simultaneously hollows the human work force out.

Furthermore, the bargaining power shift is enhanced through additional losses of workplaces in industrialized economies – *offshoring* or also known as *offshore outsourcing* (Levine 2012) and outsourcing in the own economies. A rough scope of the outsourcing tendencies within western economies can only be partly quantified (Bosch 2012, p. 14 f.). Offshoring in western societies is already an established phenomenon – a study of the Austrian Chamber of Labor (German: Arbeiterkammer) refers to the job loss within the textile industry of 87,500 jobs between 1970 and 2004 in Austria, whereas the increased demand

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of textile commodities due to the higher population and higher living standards of the present (Böhm and Lahodinsky 2014, 40 f.). A study of the Austrian Press Agency (APA) about the relocation of multinational organizations out of Austria refers to 70,000 job losses between 2008 and 2012 which led to tax losses of 1.26 billion Euros (Wirtschaftsblatt 2013). It should be emphasized that these job losses refer only to the relocation of entire organizations without the consideration of offshoring of organizational departments or particular jobs. ORF (2014a) reports about 94 recorded organizational closures in Austria in the previous eleven years divided into 33 bankruptcies, 32 shutdowns and 25 relocations. In this context, the question arises whether the bankruptcies were caused indirectly by former offshores of competitive international organizations to developing countries. The recent case of the multinational organization the Voestalpine in Linz, which threatens the Austrian government to relocate with its approximately 46,000 employees to the US, emphasizes the actuality and current threat of this subject matter (Techt 2014).

The constant decreasing number of jobs meets a steadily growing need for jobs. In 2013, the working population in Austria consisted of 4,175,200 employees, 521,000 more than in 1994 with 3,654,200 employees (Statistik Austria 2014a). The difference between 2013 and 1970 is significantly higher with 4,175,200 in 2013 versus 2,386,587 dependent employees in 1970. The accumulation of numerous labor supply trends such as job-immigration, feminization of employment, demographic developments and new working time structures enhance the growth of the total labor force significantly and shapes labor market developments since the 1980s (OECD 1982). Even though, the consequences of the increasing labor supply matters the OECD countries since decades, the labor supply still is enhanced through the incessantly propagation of job-immigration and feminization of employment. As far as job-immigration is concerned, employees who just moved to developed economies very often work in precarious or informal job arrangements, because they increase the number of the labor supply, which hollows out their job conditions and those of other employees. According to Sara Lemos (2008) this form of labor inflows is part of the explanation for high unemployment rates or depressed wages in immigration countries. Recent developments such as the abolition of the last labor market barriers for Romanians and Bulgarians who are able to work within the entire EU since January 2014 (Schmaler 2014), illustrate international alignments of labor markets politics.

Feminization of employment led to a paradigmatic flexibilization of the gender norm, because of the increasing demand for gainful employment and transnational mobility lead to the continuous erosion of the traditional “male breadwinner model” – job arrangements which enable the secure of one’s livelihood. At the same time women overtake the monetarized support role for their households instead of working in so called bread-earner job arrangements with appropriate incomes. In other words, there is a contradiction between the process of emancipation on labor markets and their unequal and paradox integration into employment. Securing the livelihood and overtaking social responsibility shapes the feminization, which leads to a decrease in income rates and worsening of working conditions for the entire labor supply, because of the increasing overall labor supply (Wichterich 2011).

### *The crisis of (gainful) employment*

The crisis of (gainful) employment refers to the decrease of formal full-time employment which gets replaced by the increasing number of jobs in the informal sector. In Austria, the latest increases of jobs were mainly in Mini-Jobs, temporary and part-time arrangements as well as fictitious self-employments (Wichterich 2011; Geisberger and Knittler 2010). The

crisis of (gainful) employment, which is occasionally visible in terms of *jobless growth* and caused by the globalized competition of economies, leads to the inherent necessity of the adoption of humans and labor market structures to the globalized competition of undercutting through flexibilization, cost cutting and social downsizing. The deregulation of the labor market – the erosion of collective bargaining law, dismissal protection, maternity protection, et cetera – and the reduction of labor costs – wage-dumping, establishment of the low-wage sector and Mini-jobs, informalization and flexibilization – implies the end of standard employments, of the fully-employed *white male bread winner* in the western industrialized nations in the middle run, which characterized the labor market in the Keynesian Welfare state oriented form of capitalism (Wichterich 2011).

The contemporary global politic-economic structure shapes the labor market demand for the disadvantage of the employees and for the advantage of the employers – mainly of multinational organizations, which means that employees accept precarious or working-poor labor arrangements against their will more easily, because in some cases unemployment represents the only alternative.

#### *Precarious gainful employment*

Precarity refers to job arrangements in which employees earn significantly less, lack employment securities and social integration compared to the standards of full-time employment. Thus, precarious employment causes subjective losses of meanings, lacks of recognition, planning uncertainty, forced political apathy tendencies and societal isolation. Precarity signifies different overall life conditions beyond gainful employment up to living under the risk of poverty, because individuals face precarity if their working benefits are insufficient to secure ones' livelihood or enable a minimum of cultural and societal participation. Consequently, such working conditions lead to increasing deprivation and poverty rates, because precarious forms of employment cause the preclusion of equal integration in social networks within organizations as well as at social networks outside enterprises (Brinkmann et al. 2006). In addition, precarious employment is characterized by the lack of institutional grounded social and participation rights. In general, minimum tariffs, opportunities for workplace codetermination, operating agreements and social rights of protection such as dismissal protection or pension benefits pertain in their entirety only for standard full-time employment. Finally, precarious employment is also characterized through the occupational range of duty. It includes forms of employment which result in a permanent loss of meaning or the opposite consequence of a pathological over identification with the job, possibly caused by work mania, burn-out syndrome, inability to relax or the loss of private values (Brinkmann et al. 2006).

The literature differs between *objective processes of casualization* and *subjective anxiety of casualization*. The numbers of employees, who are affected with objective precarious working conditions including the phenomenon as described above, can be extended with those of subjective anxiety of casualization – individuals who currently work in standard employments and might easily drop into precarious job arrangements. These forms of anxieties are often characterized by a latent nature, because careers can turn into precarious realities literally overnight. Such labor realignments may occur if internal organizational realignments and reorganizations weaken person's position in terms of the

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status hierarchy or if workplaces are substituted with external work forces through outsourcing.

A comparison of the Austrian with the German labor market policies and situations illustrates different dimensions and impacts of labor market deregulations in quite similar economic structures. The deregulation of German labor markets is occasionally characterized, for instance, through the lack of a broad hourly minimum wage. Consequently, the low-wage labor market sector in Germany contains a wide spread of its (very) low hourly wages. In 2010, the gross salary per hour was below the of the German labor union demanded minimum wage of 8.50 Euros for 6.8 million out of 40.37 million employees in the German labor market and 2.5 million individuals earned even less than 6.00 Euros per hour (Bosch 2012). Furthermore, Germany is infamous for its “One-Euro Jobs”. Current data about exact numbers of “One-Euro jobbers” is difficult to obtain. According to Stegemann (2009) in 2009 around 750,000 individuals worked for a gross salary of *one Euro per hour*<sup>3</sup>. Such low wages do not exist in other western countries with minimum standards such as Austria, France, Belgium, Denmark or Sweden.

In Germany the number of employees in the low-wage sector increased from 5.6 million (17.7 percent of the German labor force) in 1995 to 7.9 million (23.1 percent) in 2010. *One-Euro jobs* represent one extreme of the significant income inequality, which faces the opposite income pole with wages of several millions such as the bank manager Josef Ackermann with an income of 14 million Euros in 2010. Experts emphasize a never before existing income inequality in human history (Traunmüller 2014).

### *New labor market tendencies – arising atypical forms of employment*

Similar to precarious job arrangements, atypical forms of employment distinguish themselves from standard employment with the difference that lacks the analyses whether the job arrangement secures ones’ livelihood or not. In this context, standard employment refers to full-time job arrangement which fulfills the particular collective expectation (Wagner 2013). Precarious and low-wage job arrangements mainly occur in atypical forms of employment, but not all non-standard forms of employment are precarious, perceived as precarious or in the low-wage sector. Most of atypical or non-standard forms of employment contain, however, potentials of precarity. Especially legal precarity is connected to almost any non-standard form of employment (Brinkmann et al. 2006, p. 19).

Atypical employment may occur in several forms of job arrangements. In Austria as well as in other European nations are the most common part-time employment, (fictitious) self-employment, informal work (black or grey economy), home-work or telework, (sub-) contract or temporary work and marginal employment also known as mini-jobs. These forms of employment except part-time employment differ from regular standards especially in terms of the remuneration rates and occupational standards or protections such as dismissal protection (Bosch 2012, p. 16). Wagner (2013) emphasizes that atypical

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3 The easiest and most common method of determining the employment quality is the wage per hour. Furthermore it enables to compare forms of employment, enterprises, industries, countries and developments and stages on the timeline (Bosch 2012).

In 2005, the German government introduced the Basic Income Support for Job-Seekers. The workfare program called “One-Euro Jobs” was part of this reform. These are temporary, mainly part-time jobs with the main target of integrating unemployed into the work force. As One-Euro Jobs are no regular forms of employment there is no need of labor contracts (Piekartz 2014).

employment also occurs in full-time job arrangements. Thus, full-time employment can only be partial seen as the complement to partial employment, because the development of atypical employment occurs likewise in full-time job arrangements. In the first quarter 2013, 530,300 full-time employees – 20 percent of the Austrian labor force – worked in All-in-arrangements. This significant share implies that this form of employment exists beyond managers or executives (Wagner 2103).

Although economists refer to the need of flexible forms of employment due to economic structures enhance by the economic crisis of 2008, the Austrian labor market was also shaped by structural movements towards atypical employment and growing income inequalities before 2008 (Geisberger und Knittler 2010). Between 2000 and 2012 the Austrian labor force increased by 498,000 work arrangements which is equal to 13.5 percent – from 3,686,000 to 4,184,000, whereas of those only 28,000 jobs were full-time job arrangements – 5.6 percent. The number of fully-employed women even decreased in this period by 16,800 individuals (Wagner 2013) and full-time job arrangements even declined in 2009 (Geisberger and Knittler 2010). Between 2004 and 2012 the atypical employment rate of the Austrian labor market increased from 26.1 percent to 31.2 percent – in 2012 1,132,000 individuals worked in atypical job arrangements, of which 76.9 percent were women (Wagner 2013).

Empirical evidence proves that people in atypical employment face low-wage job arrangements significantly more frequently than in standard employment. According to the Structure of Earnings Survey 2006 made by the Statistics Austria, 27 percent of atypical employment and 8.7 of standard employment (results to a total rate of 14.7 percent) were in the production and services sector in organizations with a minimum of ten employees characterized by gross wages below the low-wage threshold<sup>4</sup> of 7.65 Euro per hour (Geisberger and Knittler 2010). Furthermore, in 2011, 79 percent of the Austrian *working poor* worked in atypical forms of employment in terms of working times (Matt et al. 2011).

#### *Part-Time Employment*

According to Statistik Austria (2014b) 710,100 individuals out of the 3,793,500 comprehensive Austrian labor force worked in part-time job arrangements in 2003. In 2009 1,002,800 were part-time employees out of the total dependent labor force of 4,077,700. Between 2012 and 2013, the number of part-time employees increased by 45,100 to 1,110,300 part-time employees or 26.5 percent out of 4,175,200 Austrian. Part-time employment is a female dominated labor market sector. In 2013 887,500 women in contrast to 222,700 men worked in part-time job arrangements (Statistik Austria 2014b). Moreover, in 2012 44.9 percent of the female labor force worked in Austria in part-time work arrangements compared to 9 percent of the male labor force. 12 years earlier these rates referred to 32.3 percent among women and 4 percent among men (Wagner 2013).

In this aspect, part-time employment only represents actual advantages if individuals explicitly prefer part-time jobs than full-time employment. Part-time employment has

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<sup>4</sup> Wage compare relative values, because of the varying consumer power as a result of inflation rates in different national economies. Consequently, according to standards of numerous reputable international studies, the low-wage threshold is two third of the median wage (Geisberger and Knittler 2010; Bosch 2012, p. 8). This leads to an hourly low wage threshold of 7.65 Euro in Austria which would lead to a monthly gross income of 1,325 Euro (Geisberger and Knittler 2010).

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ever since been problematic for those who strive for a full-time job arrangement, because incomes and social entitlements of part-time employment does not cover subsistence needs without external supply (Brinkmann et al. 2006, 33) – underemployment which is also known as part-time unemployment (Ek and Holmlund 2014). Studies in Germany report up to 51 percent of women who in particular want to move into full-time employment or increase their salaries through additional working hours (Hinterseer 2013; Brinkmann et al. 2006, 32 f.; Booth and van Ours 2011). The fact that 34 percent of part-time employees view their job as a “workaround” and up to half of the employees would definitely prefer to work more implies that part-time employment is characterized by being a preferred arrangement under special circumstances rather than as a permanent status. These forms of employment are frequently socially secured and thus not automatically precarious. Nevertheless, part-time employees often struggle with unfavorable working times and are often seen as peripheral employees. Data of the Statistik Austria shows the connection between lower occupational qualifications and higher part-time rates (Hinterseer 2013).

### *Subcontracted and temporary employment*

Between 2000 and 2008 increased the number of temporarily employed continuously from 30,000 to 68,000, whereas this number decreased down to 57,000 in 2009, because of the economic crises. With the economic recovery in 2010 increased the temporarily employed up to the peak of 78,414 in 2012 (Wagner 2013). According to Eichhorst et al. (2010, 21) the rate of temporary workers increased within the Austrian labor market supply from 0.8 to 1.5 percent between 2000 and 2007.

Temporary labor is characterized by significantly lower employment stabilities than of those in standard employments, because employment agencies tend to “hire and fire” faster (Sommer 2010, 40). In the temporary labor market sector half of all employment arrangements last a maximum of 89 days. Temporary employment agencies pass the risk of financing periods in which their personnel is not being leased out on to their employees and thus contract workers face a four times greater risk of being unemployed than the regular labor force (Bosch 2012, 20). Moreover, subcontracted labor forces are confronted with significant wage gaps compared to the conventional labor market. Investigations prove that any starting salaries in the temporary sector refer to the low-wage sector (Sommer 2010, 40 f.). Furthermore, Bosch (2012) refers to studies that prove higher psychological disorders and enduring stress situations within the temporary sectors, occasionally due to dissatisfactions about low wages and consistent job uncertainties.

### *“Fictitious” Self-employment*

Enterprises cooperate more frequently with single-self-employed (German: Solo-Selbstständige) who work depend and are bound by instructions, instead of avoid permanent direct employments (Bosch 2012, 25). The Austrian labor force rate of self-employed increased between 2001 and 2008 from 2.7 to 4.3 percent (Eichhorst et al. 2010). According to Statistik Austria (2014b) 476.900 self-employed individuals was the annual average of 2013 which represents 8.8 percent<sup>5</sup> of the labor force. Furthermore, the amount of freelancers – self-employed without business licenses – increased from 23,184 in 2000 to

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<sup>5</sup> The numbers are excluding the self-employed of the agriculture which would increase the rate to 11.4 percent.

44,191 in 2012 (Wagner 2013). In 2013, 25,408,700 self-employed worked in the EU (15) which represents 13.2 percent<sup>6</sup> of the entire labor force.

The share of contracts to produce a work, which are also known as sham contracts or as fictitious self-employed working arrangements, is compared to other depend atypical forms of employment only very difficult to quantify (Wagner 2013), because it is hard to distinguish from real contracts between two independent business partners. Numerous case studies and industry surveys prove an increase of the abusive use of contracts to produce a work, with advanced examples in the meat industry, where the line work is divided in self-employed activities, or how the construction industry circumvent minimum-wages with through complex subcontractor structures (Bosch 2012).

Apart from the misuse of fictitious self-employment the characteristics of self-employment is very often misunderstood by the affected individuals due to the high tax duties, for instance, and thus might easily lead to traps of poverty. Eichhorst et al. (2010, 27) refer to a study in which one fifth of the respondents underestimated the costs of social coverage. This leads to certain information deficits and current need for consultation.

#### *Fixed-term employment*

This form of atypical employment gained significantly importance within the past previous decades in welfare state such as Austria. The statistic Austria captured fixed-term employed firstly in 2004. Between 2005 and 2012 the number of fixed-term employees increased continuously by 29,000 individuals up to 333,700 (Wagner 2013). In 2003 6.6 percent of the Austrian labor force worked in fixed-term employment compared to the overall average of the EU of 12.8 percent (Brinkmann et al. 2006, 25 f.).

Fixed-term employment is often used for job starters, but the transition into regular forms of employment after fixed-term job arrangements is relatively low – only one fourth, because of flexibility aspects for the employers (Bosch 2012, 25). In general, fixed-term employment undermines the negotiation position of the labor force with consequences of comparatively unsecure job careers as well as lower income opportunities and poorer working conditions. Brinkmann et al. (2006, 26 f.) emphasize linkages between fixed-term employments and increased risks of health and security. Finally, up to present days numerous labor unions take subordinate attention to fixed-term employees and in general these employees are significant less organized (Brinkmann et al. 2006, 27).

#### *Marginal Employment – “Mini-Jobber”*

In Austria marginal employment includes any form of employment with a lower monthly remuneration of 395.31 Euro<sup>7</sup> in 2014 (386.80 in 2013) independent of the weekly working hours or monthly work effort. Marginal employment witnessed exploitive growth rates since the 1980s, because this form of employment is a welcoming opportunity to discharge organizations. Between 2000 and 2012 increased the number of marginally employed, also known as mini-jobber, by 57.8 percent from 181,500 to 286,500 individuals in Austria (Wagner 2013). Furthermore, the marginally employed labor force has nearly doubled it-

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<sup>6</sup> Excluding the self-employed of agriculture.

<sup>7</sup> The marginal wage threshold in Germany has been since the 01.01.2013 increased from 400 to 450 Euro.

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self between 1987 and 2011 in Austria. According to the ORF (2013) 316,510 mini-jobbers worked in average in 2012. Since 2005 is the number of individuals with side jobs relatively stable – roughly 150,000 employees, however, the exact number of marginally employed is unknown. The significant segmentation of the labor market in Austria since the 1990s and the decades-long trend for this form of employment imply forecasts and prospective developments of constant growing trends of this form of employment (ORF 2013).

Marginally employed are confronted with labor law-related disadvantages, because of the lack of health and pension insurances, for instance. Moreover, mini-jobbers are entitled to holiday pay, sickness benefits as well as the 13<sup>th</sup> and 14<sup>th</sup> monthly salary like employees of standard employments. In reality, marginally employed receive hardly any special payments and are in threats of losing their jobs in case of longer periods of sicknesses (ORF 2013).

### *Working Poor*

The Austrian Chamber of Labor classifies individuals between the age of 18 and 64 as working poor if their entire household income including possible social benefits is in spite of their active working status below the poverty threshold, which is currently in Austria a net income of 1,066 Euro divided into 12 remunerations (which is equal to 914 Euro in 14 paid month). Major reasons for poverty despite employment statuses might refer to generally too low incomes, atypical employments, impermanent employment or if earners face difficult budgetary situations such as to secure the livelihood of several individuals (Austrian Chamber of Labor 2013).

Although working poor shapes since longer periods the reality of numerous individuals and households in Austria, it was only little discussed in scientific discourses (Statistik Austria 2009; Matt et al. 2011, 6 f.). Between 2005 and 2012 the number of working poor increased from 257,000 to 298,500 individuals or 8.2 percent of the entire Austrian labor force (Austrian Chamber of Labor 2014). Around 171,000 children and 101,000 working poors' relatives are affected of working poor conditions within their households in Austria which corresponds to a total of 471,000 affected individuals (Austrian Chamber of Labor 2013). Due to the use of new data to measure the total in-work poverty rate, increased the rate of the EU27 from eight percent in 2007 to 18 percent in 2009 (Eurofound 2010, 2 f.).

An indicator for the advancing low-wage labor market sectors is the high number of all-year (minimum 11 month per year) full-time employees of 158,400, which represent 53 percent of all working poor. In addition, the rate of working poor varies between several personal characteristics such as the origin – seven percent of the Austrian citizens are affected of working poor compared to 19 percent of individuals without European citizenships. In general, younger individuals are more frequently affected than elderly, which makes it more difficult for labor market entrants to find jobs with sufficient salaries (Austrian Labor Chamber 2013). Another individual characteristic is education, as nearly three quarter of the working poor lack a high school certificate and only six percent of the university graduates are affected (Austrian Chamber of Labor 2014, 3f.).

The reason why the working poor rate did not significantly grow between 2004 (253,000) and 2011 (each time around 200,000) is not imperatively due to positive labor advancements, but 38,000 former working poor lost because of poor employment situations their jobs (Austrian Chamber of Labor 2013, 5 f.).

*The role of Unemployment in a precarious labor market*

Unemployment represents the consequences of the contemporary shift of the labor market equilibrium. It is a form of pressure of employers for spreading atypical forms of employment, because of the principle of substitution of labor. In June 2014, 281,555 employees were unemployed out of the 3,528,000 comprehensive dependent Austrian labor forces which grew by 19,000 respectively 0.5 percent compared to the previous year. The unemployment rate grew between 2013 and 2014 by 16.2 percent or 39,324 individuals. The increase of the unemployment rate was comparatively high in Vienna with 17,487 individuals or 21.3 percent, followed by Upper Austria with 5,508 additional unemployed individuals or 20.8 percent. The growth of the unemployment rate between June 2013 and June 2014 was heavily concentrated to the service sector (tourism excluded) with additional 29,361 unemployed (15.6 percent) to 217,764 registered unemployed (Putz 2014). The estimated national unemployment rate was in June 2014 around 7.4 percent compared to Eurostat unemployment rate of Austria of 4.7 percent based on data of surveys including seasonally adjusted figures in Mai 2014. 31,914 additional versus 35,025 less vacant jobs lead to 28,987 registered available jobs. The unemployment dwell time – the average period of time between the beginning and end of the unemployment status – was 106 days in June 2014 which is eight days longer than in the previous year. Finally, the number of occupational training participants grew by 908 (1.5 percent) to 73,073 individuals in June 2014 (Putz 2014). It is significantly difficult to find jobs for elderly people and even worse for disabled individuals with low qualifications whose unemployment rate refers to 47 percent. In addition, the complete EU-labor market opening for Rumania and Bulgaria will affect the Austrian labor market in 2014 and beyond in contrast to Rudolf Hundstorfer's estimate of low amounts of job seekers, because many high qualified Rumanians and Bulgarians would be already in Austria (Sileitsch-Parzer 2014).

The current unemployment rate grew according to the media to record dimensions in Austria (Sileitsch-Parzer 2014; Format 2013; Statistik Austria 2014b; News 2014; ORF 2014b; Hierländer 2014). According to the Public Employment Service Austria (AMS) the unemployment rate is 7.6 percent which is according to Sileitsch-Parzer (2014) the second highest rate since the Second World War – only in 1953 was the rate higher with 8.7 percent.

According to economic and social experts (e.g. Butterwegge 2009; Ek and Holmlund 2014; Hierländer 2014; Sileitsch-Parzer 2014; Format 2013), unemployment calculations do not capture the entire unemployed labor force and thus do not capture all dimensions of joblessness – individuals who quit the job searches due to lack of perspectives or those who were sent in early retirements instead of to the Public Employment Service Austria as well as any participants of further educations. In fact, the actual unemployment rate is roughly twice as high as those of the main stream measurements rates of the European Union and at least between 60 percent (Hierländer 2014) and 100 percent (Format 2013) higher than the AMS statistics. Austria purchases his premium position within the European unemployment statistics with expensive early retirements and further training programs. Taking the mentioned hidden unemployed into consideration was the unemployment rate of the previous year neither 7.6 percent according to the AMS nor five percent according to the Eurostat more likely 10.2 percent (Hierländer 2014).

Furthermore, underemployment or part-time unemployment is not captured by mainstream data of unemployment (Ek and Holmlund 2014; Sileitsch-Parzer 2014). Part-

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time unemployment refers to any people who work in part-time or atypical job arrangement involuntarily in the sense that these workers prefer to work longer hours at prevailing hourly wage rates. The scope of part-time unemployment is hard measureable. The rate of the part-time underemployed corresponds currently to roughly 7.7 percent of the entire Austrian workforce – is equal to 340,000 individuals (Schweighofer 2013).

However, there is a visible current tendency of an increasing unemployment development. Even though, the Austrian economy was recently characterized by a slight upturn and economic recovery, however, the improvements of unemployment rates require according Social Minister Rudolf Hundstorfer significantly higher economic growth tendencies (News 2014; ORF 2014b).

### **Societal Impacts of labor markets as economic tool**

#### *The role of unemployment*

The unemployment figure is a key figure in western labor markets occasionally in terms of job offer acceptance of the labor force. According to Abraham et al. (2013) job offer acceptance often depends on reservation wage concepts. The labor market as one market type follows the rules and structures of markets – supply-demand equilibrium. The shift of the labor market equilibrium enhances the negotiating position of employers and simultaneously weakens the position of employees. In this context, studies (Abraham et al. 2013) refer, for instance, to positive correlations between individual unemployment and the willingness to accept more likely unpleasant labor conditions such as that empirical evidences prove higher migration rates among the unemployed. Contemporary distortions of labor market equilibriums in Austria cause higher pressure in terms of job offer acceptances, because of the lack of job alternatives. This results in higher pressures to accept lower labor conditions and leads to new job arrangements acceptances such as atypical types of employment. In this context, employees tend to take working-poor or precarious employment more likely against their will.

In addition, (high) unemployment rates concern national economies, because unemployed individuals are not only financed by taxes but also even more importantly they lack social security contributions in welfare-state oriented economies such as Austria. In combination with the continuous replace of full-time standard employment by atypical employment welfare-oriented pension systems additionally struggle with decreasing pension contributions and thus face fundamental financial issues. According to the report of the Credit Suisse (Neff et al. 2012, 10 f.), the financial challenges of pension funds are very complex. The Pension Funds Survey conducted for Credit Suisse emphasizes the challenges of financing pension funds in a long-term low-interest environment which 43 percent of the sample agreed with, followed by the European debt crisis with 15 percent agreement, high minimum conversion rates with eleven percent, demographic trends with nine percent, too high minimum interest rates with eight percent and finally increasing administrative costs with seven percent. These results imply a significant alignment of pension funds on financial markets. The same report presents that the Austrian pension funds hold roughly seven percent of their assets in liquid assets in contrast to around 30 percent stocks, to roughly 45 percent bonds and ten percent other assets. The pension fund system, which is designed for coping social needs of the (labor) society, drifted into risky financial markets partly in order to finance the contemporary structures. The possible consequences of this form of alignment are high, because in case of financial crises, for instance, incurred

high capital losses for societies, the possible extent of which is not even remotely tangible yet.

The relation between unemployment and criminality is a subject of much debate within sciences in the previous past. Bennett and Eichholz (2007) presented increasing criminality rates – three criminal acts each 100 citizens in 1963 compared to eight in 1993 in Germany; the number of prisoners in the US increased from 1.63 million in 1996 to 2.19 in 2005 – and its correlation to unemployment by reference to several (meta-) studies. In 1987 a meta-study of Chiricos in the US proved a positive correlation between unemployment rates and criminality, because of its 42 studies showed roughly the half a correlation between unemployment and criminality (Bennett and Eichholz 2007). Possible reasons for higher crime rates within the unemployed or within precarious employed refer apart from monetary or economic backgrounds to social and psychological backgrounds such as the recognition in social networks, gender-specific identity features as well as the quest after social recognition which is undermined by unsecure forms of employment as well as unemployment (Bennett and Eichholz 2007).

#### *Collective consequences of contemporary labor market structures*

The macroeconomic consequences of contemporary labor market structures are only partly caused by unemployment and aggravated through increasing atypical employment tendencies especially of informal, precarious and poor job arrangements. As far as pension funds are concerned, these forms of employment often completely lack pension contributions, which additionally weaken the finance of pension funds. Labor-related tax duties are important tax revenues for governments, which are highly linked to full-time employment and thus additionally weaken (welfare) states.

Economists emphasize numerous negative issues of the exorbitant costs of welfare state transfer benefits occasionally to unemployed or low-wage earners, as it would harm Austrian international competition factors and furthermore according to neoliberal proponents, less performance-oriented individuals such as unemployed would live on the costs of higher performance-oriented individuals. The division of the Austrian labor force and thus the entire society through occasionally precarious or poverty living conditions, huge wage gaps or high unemployment rates causes societal tensions and gaps between the entire social system and the economy as subsystem. Regular dimensions of tensions are coped by political linkage between the systems. The duty of the modern state is to act in the name of law and order in case of above-average tensions (Willke 2003, 88) such as it was in Paris and London in the previous decade. However, the literature mentions more frequently the transition from welfare-state structures to security state structures. Proponents of neoliberal concepts for instance demand a tight welfare state with little welfare expenses. In this respect, it should be emphasized that savings of the a tight welfare state are partly only fictitious savings, because they convert to expenses of the security state through the need of coping and preventing societal tensions (Castel 2011).

The number of individuals living under precarious and poor labor conditions is extended by their relatives, marriage partners and children who are called as *victims through closeness* (Kieselbach 1994, 244 f.). Poor working conditions or unemployment of family members lead to financial problems as well as additional daily concerns such as the lack of plannability of occupational futures or the possibilities of social exclusion and stigmatization of their households. In general, families and children of the unemployed or working

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poor possess an ambivalent role for the unemployed or working poor, because they represent a meaningful supporting role on the one side, and on the other side they cause additional financial burdens due to the responsibility of these people, which is perceived by unemployed or working poor not as manageable to cover anymore. Moreover, the majority of the unemployed parents endeavor intensively to relieve their children of the consequences of unemployment. Familial stress, due to the occupational statuses, causes at the relatives comparable symptoms such as increased possibilities of appearance of psychosomatic diseases within children of unemployed or working-poor families. Studies prove that children of poor working households are more frequently ill of infectious and chronic diseases such as disorders of the immune system, gastrointestinal diseases or influenza and colds than comparable children of regularly employed parents. Furthermore, such situations affect the psyche of children with the results of significant lower general self-esteem, more frequent self-derogatory statements, higher rates of depression, feelings of loneliness, higher sensibilities as well as less competent to cope with stress (Kieselbach 1994, 245 f.).

### *Individual consequences of contemporary labor market structures*

The impact of contemporary, flexible, poor and precarious labor market conditions shape not only the individuals who are confronted with the particular conditions – within the “*zone of precarity*” (Kraemer and Speidel 2004) – but also other labor market segments including employees of full-time job arrangements. The “*zone of normality*” faces subjective latent as well as manifested fears of casualization and unemployment, which appear in partly protected sectors of the labor market (Kraemer and Speidel 2004; Gimpelson and Oshchepkov 2012). Its continuous spread refers to the generalization of social uncertainty and destabilization. Employees fear about their uncertain labor future, because organizations can change their employment status into precarious respectively temporary forms of employment at any time, as it continuously happens in this period (Kraemer and Speidel 2004). Although precarious job arrangements or higher unemployment rates appear currently primarily in certain labor market segments and thus do not affect the plurality of the Austrian labor force, anxiety of casualization or unemployment may diffuse within organizations and labor market segments and the spread to currently unexpected above average protected labor segments could be faster than estimated (Kraemer and Speidel 2004). Thus, a significantly greater part of labor societies is concerned with fears of precarity or unemployment than it tangible, which implies its difficult measurability (Gimpelson and Oshchepkov 2012).

Experts (e.g. Stiglitz 2013; Famira-Mühlberger and Fuchs 2013; Castell 2011) refer to the development of aggravated working conditions within full-time job arrangements. Especially after the previous economic and financial crisis, managers receive frequently incentives and bonuses for dismissing employees without (suitable) replacements in terms of cost reduction measures (Stiglitz 2013). The resulting pressure of increasing amounts of work of full-time employees is partly tangible in terms of unpaid extra hours. Famira-Mühlberger and Fuchs (2013) elaborated the situation of unpaid extra hours in Austria within the previous years – in 2012, the Austrian labor force performed 68 million unpaid extra hours, which is equal to 1.2 percent of the overall volume of work in Austria. The affected labor force rate of unpaid extra hours referred to 167,656 individuals which are equal to 5.6 percent in 2012. Roughly two third of the unpaid extra hours were done by employees especially with higher qualifications such as academic professions or executives and more frequently in full-time employments than atypical employment.

Unemployment, informal working conditions as well as economic recessions have shown to negatively affect health-related outcomes such as subjective health risks, symptoms of anxiety and depression, higher vulnerabilities to obtain health-damaging behaviors such as smoking, excessive alcohol or drug consumption, decreased physical activity, obesogenic diets as well as even mortality, which has been proved by numerous studies and meta analyses (e.g., Kieselbach 1994, 240 f.; Oschmiansky 2010; Bennett and Eichholz 2007; Castel 2011; Jones et al. 2011; Rogge and Schunck 2010; Lopez-Valcarcel and Urbanos-Garrido 2014). According to Lopez-Valcarcel and Urbanos-Garrido (2014), public health literature proves that employments protects and strengthens health. Longitudinal studies from Britain and Sweden indicate an increasing problem of drinking in unemployed men as well as increased obesity in unemployed women, similar to results of Finnish panel studies which refer to the impact of an individual's employment progression on alcohol and weight behavior (Rogge and Schunck 2010). An American study illustrates that the likelihood of heavy drinking raises due to unemployment and more importantly increases with the duration of this labor status as well as a study based on the German census data shows an increased vulnerability of health-damaging actions among the long-term unemployed (Rogge and Schunck 2010).

The situation of unemployment, poverty or precarious job arrangements implies the exclusion for the affected individuals from potential social labor markets as well as societal structures (Castel 2011; Rogge and Schunck 2010; Koßmann 2012) – Koßmann (2012) refers to the psychosocial consequences appearing from the lack of standard jobs structures such as the extension of social relationships, the allocation of social status, the shape of personal identities and the stimulation of frequent activities. Especially long-term unemployed live according to Koßmann (2012) in advanced forms of isolation – 50 percent hardly perceive personal support while 14 percent are completely isolated. These forms of exclusion lead according to Rogge and Schunck (2010) to a so called “social reward deficiency” entailing stress reactions at the neuro-regulatory level. Unemployed or social excluded individuals tend to compensate such deficiencies through health-damaging behaviors. This form of reactions enhance stress levels and thus lead to the problematic direct link between stress, consequential neuro-regulatory dysfunctions and health-damaging behaviors, which aggravates the situation of the affected individuals and frequently causes long-term health issues. Such situations also impair the overall mental as well as physical health conditions by various psychological mechanism, loss of self-esteem, pessimism about future perspectives, cognitive losses, formal thought disorders, avolition, dysthymia, suicidality, anxiety disorders and suchlike (Lopez-Valcarcel and Urbanos-Garrido 2014; Koßmann 2012).

#### *The division of the society – decoupling and de-collectivization*

Castel (2011) emphasizes that modern western labor societies struggle with the erosion of the two main collective social security systems, which carry the labor economy – the *state* and the *homogeneous socio-professional groups*. The homogeneity of occupational groups and of its collective regulating instances is hollowed out and even weakened in its foundations with the result of mass-unemployment and increasing informal employment. The occupational objectives of two equal employees may differ over night, in case of one loses his job whereas the other keeps it. Consequently, solidarity is replaced by competition between equal employees and working groups. Instead of focusing on collective targets and

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interests within groups of equal employees, individuals are forced to emphasize their differences in order to secure their working and living conditions (Castell 2011).

A flexible and individualized labor management replaces collective organizational managements based on stable employment. The modernized capitalism conducts an overall flexibilization of employment arrangements and structures, occupational careers and social security systems, which are in each case heavily connected to the employment status. Such dynamics induce de-collectivization, further individualization as well as cutbacks in social security benefits. The de-standardization of gainful employment or the individualization of work process are characterized by the transmission of entrepreneurial responsibility and costs to the employees who partial run entire production steps autonomously and need to overtake responsibilities of product qualities (Castell 2011). Increasingly major parts of employees move into permanent crisis of gainful work or securing one's livelihood, because of the advanced magnitude of the transfer of costs and risks, for instance, when chambermaids are only paid by the made rooms or waitresses need to rent the tables in restaurants (Wichterich 2011).

Moreover, another transfer of entrepreneurial risks and costs to the employees refers to the modern status of employees – employees become personal companies “Ich-AG” (I incorporated), as they take over responsibility of increasing occupational decisions, timely re-educations measures and occupation self-responsible behavior in order to maintain on the active labor market. This results in a greater distance to collective regulatory systems and thus increases the vulnerability of employees for further pressures of flexibilization. According to Castel (2011), it should be more focused on the ambivalence of individualization and de-collectivization processes, which manifests itself in diverse forms of various configurations of labor organizations and affects in different extensions nearly all employees' groups beginning from trainees up to start-up entrepreneurs. Individualization refers to the condemnation of freedom and the release from unpleasant collective constraints. However, modern employees need to bring performance according to numerous entrepreneurial and societal norms and structures but are broadly on their own and kind of “free” in terms of labor decisions. The collective constraints are in different dimension enhanced such as aggravated competitions and the constant threat of unemployment or descent career developments (Castel 2011).

However, not all groups of employees are confronted with equal magnitudes of labor pressures – some benefit from the individualistic labor market tendencies by maximizing their potentials and by realizing unknown entrepreneurial competences, which were not able among bureaucratic constraints or strict regulations – there are winners of these change processes with new opportunities to unfold their personal and occupational potentials. Numerous individuals face disadvantages of these modernization processes, because they are not able to cope with current requirements and standards or the new circumstances in general. In this context, the dividing line in the labor market and society between winners and losers – rich and poor grows and is enhanced. The division line between winners and losers has no arbitrary proceed, because the adoption with these new situations heavily depend on objective resources as well as on the organizational bases of individuals (Castel 2011).

Castel (2011) describes the destiny of the “partial social excluded” as victims of an economic and social progress based on reasons such as modernization constraints, in which these individuals have lost their position and status. The contemporary labor market structures are not only characterized by mass-unemployment but also by occupational de-qualification of the mass. In terms of deindustrialization the future of the once reputable

metal employees or fitter education is, for instance, very dubious similar to the future of highly specialized educations which are linked to precise technical production processes (Castel 2011). The desperation about the missing future perspectives is conceived in different ways between individuals, but reactions are also characterized by collective natures including resentments, which describes the reaction of individuals belonging to groups towards the end of the social ladder and find themselves in competition with members of other likewise deprived groups. The resulting shrinking solidarity within socially equals in combination with aggravated tensions between social groups decreases living quality standards – more unpleasant aspects including higher rates of unemployment or marginal forms of employment; dilapidated residential environments with air-, water- or noise pollutions; soulless urban constructions; divers ethnical groups living closely beside each other; higher crime rates; uncivilized behavior in everyday life; and tensions, conflicts as well as disturbances with security guardians. In this context, social and civil uncertainties meet and reinforce each other reciprocally. Castel (2011) emphasizes a shift of the social conflicts and threats of western societies to specific groups mainly of the suburbs. These individuals are not really integrated into the overall society, as they often belong to other cultures or have other less popular characteristics and thus face disadvantages at searching jobs. Nevertheless, the media or politics attribute the uncertainty difficulty to such minor groups, such as high criminality rates of immigrants or unemployed youth. The resulting circumstances for these individuals in order to adopt and implement stabile family connections or civilized manners are significantly aggravated. In fact, the affected youth, for instance, is less likely criminal, but more likely disoriented, but the behavior of few people is conveyed to entire groups through the distortion of information (Castel 2011).

#### *Monetary de-collectivization – deprivation*

Atypical forms of employment and unemployment refer to decreasing living standards through income cutbacks which very often meet unpleasant increases of the households' expenses. The inflation was in June 2014 at 1.9 percent which is 0.4 higher than in February 2014 in Austria (WKO 2014). The inflation is based on the consumers' price index, which covers collectively regarded the most important goods and services within one society. Contortions of this key figure appear in terms of the chosen goods especially for deprived or poor households, because they do not purchase or afford each year technological luxury devices such as flat screens or smart phones as well as long haul flights. These luxury goods and services are mostly characterized by decreasing price developments and thus the inflation rate for poor and deprived individuals is significantly higher and which refers more likely to the micro or mini-consumers' price index – 3.5 percent in April 2014 instead of 1.7 percent of the regular price index (Janek-Zenker 2014). The reality of the currency devaluation is only partly tangible by the annual values, because the accumulation of these rates is of importance – only between 2010 and 2013 the mini-consumers' price index increased by 12.3 percent in Austria (Höller 2013).

Apart from increasing expenses more and more individuals struggle with the accumulation of crises or multiple crises – including economic crises, ecological damages, illnesses, cutbacks of social benefits in terms of neoliberal adaptations of the welfare states or climate change, which lead to complex emergency situations for vulnerable households and individuals. In the previous years, the climate change led more frequently to tempests

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such as floods and the annual raining and dry periods are not any more reliable which might cause high crop failures especially noticeable for small farmers (Wichterich 2011).

The rate of financial deprivation increased from 13.7 percent in 2004 to 16.4 percent in 2010 in Austria. Contortions of the data may occur due to the definition of basic needs, because goods and services such as holidays, cars, telephone, television or washing machine are, for instance, not defined as basic needs according to the national Austrian definition. The number of individuals who were minimal two following years financially deprived has doubled between 2004 and 2010 with nearly eleven percent. This correlates with the development of number of persons in the so called open social support – it had doubled between 2000 and 2010 where nearly 180,000 people were affected (Till-Tentschert 2012). According to Fabris (2014), 14 percent of the Austrian population faced deprivation in 2013, whereas 22 percent – 1,852,000 individuals – cannot afford to cope, for instance, unexpected expenses. Significant deprivation describes circumstances of households, which cannot afford four out of the seven basic needs, which faced 355,000 individuals or four percent of the Austrian population (Fabris 2014).

### *The “invisible ghost of poverty”*

The welfare state Austria as the 7<sup>th</sup> or 12<sup>th</sup> richest country worldwide and the third richest country within the EU measured by the GDP per capita (Till-Tentschert 2012) faces the apparently invincible situation of poverty or social exclusion with stable risk of poverty rates within the previous decade between 13.2 and 18.5 percent which equals to roughly 1.2 to 1.5 million individuals (Lamei and Till-Tentschert 2005; Fabris 2014; diePresse 2013a; Statistik Austria 2014a; Springer 2013). Income is usually the criteria for poverty in terms of a lack of people’s participation and realization opportunities in order to live a desirable life within the certain society (Till-Tentschert 2012). The risk of poverty or social exclusion rate decreased from 17.7 percent – 1,431,000 individuals – in 2004 to 16.7 percent – 1,376,000 individuals – in 2007 followed by an increase to 19.7 percent – 1,627,000 – in 2008. Since then the rate was until 2012 constantly above 18 percent (18.3 percent in 2009, 18.2 percent in 2010, 19.2 percent in 2011 and 18.5 percent in 2012) (Statistik Austria 2014a). 1,201,000 individuals lived in Austria under the risk of poverty or social exclusion in 2012 (Fabris 2014). According to Springer (2013) new data show that the actual risk of poverty or social exclusion rate is significantly higher as instead of 1.2 million individuals and it has been corrected to nearly 1.5 million individuals, because of adopted measurement methods of the SILC-survey of 2012, which includes firstly administrative data about unemployment benefits or family benefits. The number of individuals living under the risk of poverty or social exclusion is higher than previously assumed – the number of 2011 is, for instance, corrected from 1.4 million to 1.6 million (Springer 2013). One fourth of the individuals who live under the risk of poverty or social exclusion are children and youth up to 19 years – 304,000 children and youth live under the risk of poverty in Austria (Fabris 2014). According to the EU-SILC 2011 in Vienna nearly one third of the children and youth live under the risk of poverty (diePresse 2013a).

Similar to deprivation the risk of poverty or social exclusion makes itself noticeable in diverse dimensions of life including residential environment, health and life expectancy, education or the overall societal participation. As far as the residential environment is concerned individuals are “forced” to live in precarious and poor living conditions such as through the social benefits structure. In 2012 six percent of the Austrian population or

541,000 individuals, were affected of overcrowded habitation<sup>8</sup>. As far as precarious residential environment is concerned, 101,000 individuals or one percent of the Austrian population lives in flats without restrooms or bathrooms, 986,000 individuals respectively 12 percent live in damp and moldy flats and 480,000 persons or six percent have to live in dark rooms. Individuals who live under the risk of poverty or social exclusion live more likely in minor flats but also in sordid neighborhoods – 1,630,000 individuals or 20 percent of the entire population struggle in their neighborhood with noise pollution (28 percent in Vienna), 900,000 or eleven percent face environmental pollution and 977,000 are confronted with criminality or vandalism. Furthermore, energy poverty shapes the reality of 263,000 Austrians or three percent of the Austrian population who are not able, for instance, to heat their shelter appropriately (Fabris 2014). According to estimations of the Austrian Chamber of Labor (German: Arbeiterkammer) 60,000 households are affected with annual gas and electricity shutoffs. Poor households pay in average between 30 and 40 percent higher energy prices compared to regular households, because of the additional costs caused by reminder charges or costs produced by the power-up or power down of gas respectively electricity (Fabris 2014).

Atypical labor markets structures enhance the spread of old-age poverty (Bosch 2012, 28 f.; Springer 2014; Leban 2013). The upcoming dimensions of this phenomenon are only approximately foreseeable as low wages do not cover an old-age protection. In 2013, 11.3 of the Austrian elderly population lived in contrast to the OECD-average of 12.8 percent under the risk of poverty (diePresse 2013b). Considering, the demographic development of Austria in combination with atypical employment tendencies increases the national expenses for pension benefits exorbitantly. The fact, that this development is under evaluated from public interests or media such as diePresse (2013b) who forecasts an increase of OECD-average public expenses for pension benefits from 9.3 percent in 2010 to 11.7 percent in 2050, implies the social and economic importance of this public concern. According to Leban (2013) the public expenses will increase without the possible countermeasures from 6.8 billion Euros in 2010 to the triple by 2035. Consequently, national pension benefits will decrease, because of the higher life expectancies – the number of persons who receive pensions constantly rises as well as their pension periods (Leban 2013).

The complexity, coherence and linkage of economic structures as well as the social crises such as unemployment or poverty are from global natures, but with different effects of the crises on the globe. In the conglomerate of crises between 2007 and 2009 occurred several closely interwoven crises mainly food crises and starvation, the more noticeable climate change as well as the from the US initiated financial crises and their global impact, which were enhanced by several interim mechanisms such as pricing and demand, investments and bank lending, retransfers, employment effects and government transfers (Wichterich 2011). Consequently, the situation of poverty in Austria is significantly interwoven with the overall global situation, and thus it is only partial solvable through national

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<sup>8</sup> Overcrowded habitation describes the situation in which too many individuals live in apartments with insufficient number of rooms: two persons in less than two rooms, three to four persons in less than three rooms, five to six persons in less than four rooms apartments and so on (Fabris 2014).

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measures, because it has become a global symptom of contemporary capitalistic and economic situation, enhanced through cascades effects such as climate change for instance.

Nevertheless, the importance of the welfare state structures in Austria is only partly tangible by reference to a poverty rate, which is calculated in societal structures without welfare structures – mainly through the lack of social and pension benefits, would the current poverty rate be at *44 percent* instead of the current actual rate of *14.4 percent* (Fabris 2014). Even though the obvious importance of the Austrian welfare state, economists demand the realignment to a more performance oriented welfare state, which pursuits instead of the goals of welfare state principles of decreasing social gaps, social-political activation strategies in terms of self-responsibility and self-discipline according to the neoliberal dictate (e.g. Michalitsch 2006; Castel 2011; Wichterich 2011; Butterwegge 2009; Dahme 2006). The reconstruction of the “Keynesian welfare state” is justified, that the welfare state impairs in times of globalization the competition factors of welfare states and its economies with other international business locations. The aims of social transfers in the future are not primarily to strengthen the purchase power of poor individuals or to enable their societal participation, more likely they should invest into the employability of the citizens by enhancing self-discipline and self-responsibility.

### Conclusion and looking up into the Future

In case of considering the perceptions and recommendations of main stream or neoliberal oriented economists in terms of the major alignment of a deregulated market and modernized state with performance-oriented and self-responsible individuals, it seems as our collective is on the right way to solve contemporary societal or economic challenges and crises. It is interesting to observe that according to neoliberal proponents the fundamental politic-economic realignment is still to slow, as welfare structures interfere with the doctrine of salvation – the self-regulating market, which apparently follows only one target – profit-maximization of the super-rich by enhancing the gap between rich and poor (Stiglitz 2013). In this context, liquid assets move from entire societies, economies and nation states towards the hand of few individuals and thus are taken out of economic and societal capacities. Consequently, the collective lacks continuously more assets, for instance, for welfare state distributions. In this aspect, the question arises why political and economic decisions are made without the consideration of societal reputable experts, although recently more and more experiences prove that their perceptions very often occurred (Traunmüller 2014).

This paper refers to societal issues such as unemployment, risk of poverty rates or similar economic key figures. Some powerful groups use these figures for their interests and thus distort the results according to their needs, as the subsequent adaption of the poverty rate in Austria proves. At the first look none of these well-known economic and societal challenges are indeed new phenomenon. However, the tangibility of the new atypical labor market developments is relatively low, because of the lack of long-term experiences of the consequences in combination with the difficult measurability of its magnitude. An accumulation of these new societal and economic challenges of atypical labor markets, the de-collectivization of the society and recent poverty and deprivation development in terms of more detailed analyzes of these developments in western societies due to the economic and societal situation leads to a totally new situation whose tangibility is once again even more hardly comprehensible. Reputable experts such as Robert Castel (2011), Wichterich (2011) or Löwy (2005) elaborate total new data about the current scope of societal issues, whose magnitude harms the overall capitalistic existence, even though they lack to consid-

er further societal issues such as the demographic developments, the exorbitant levels of national debts, the scope of previous economic crises, ecological outgrowths and those of the financial markets as well as the accumulation of these multiple crises both for individuals and entire continents. Even though they only approach to the “entire” magnitude of capitalistic and modern excesses, they already refer to fundamental societal threats (Traunmüller 2014).

The consensus of the contemporary global public debate about economic situation is the high priority of creating economic growth and stability as a result of the previous initially financial crises and further economic crises, whose magnitude was already heading towards an overall financial crash. In this context, the debts of nation states, poverty rates and the incessantly growing gap between rich and poor are important aspects in terms of economic stability, for instance. Nonetheless, tendencies seem to develop even faster in opposite directions, as this paper analyzed, achieved magnitudes of poverty, unemployment and the gap between rich and poor record levels in addition to newly arising collective challenges of privatization and precarious labor markets. The impacts of these arising challenges are only partly tangible and detailed scopes are only in the long terms measureable (Tálos 2002). This leads to a collective underestimation of these factors, as privatization prettifies national balances or mitigates annual national debts and atypical employment or early retirements reduce unemployment rates and thus prettifies the labor market situation in western societies.

These new arising problems, which enhance the already difficult situation for modern economics, enhance the accumulation of multiple crises, which hardly enjoy any attention, because experts are specialized in their particular fields of such as poverty or labor markets, for instance, and thus the real threat of the overall impact of the arising crises is totally underestimated, whose scope is only partly analyzed in this paper due to the complexity. In this context, situations of the over-aging western societies, magnitudes of the national debts, ecological pressures to the economy or global financial markets which operate beyond societal assumptions but influence modern economics. It should be emphasized that none of these issues are so far only partially solved; in contrast their development is proceeding with continuously higher progresses. Despite of the threatening scope of the accumulation of contemporary societal and economic crises, mainstream economists still incessantly promote strategies, which have established to achieve opposite results in the previous past. Josef Stiglitz (2004; 2013) emphasizes how current global policies effect national economies worldwide in unpleasant ways, which leads to the question of the targets of the global alignment? Stiglitz (2004, 136 f.) refers to several critics against the IMF, whose economic measures for economic growths lead towards economic crises and that were based on hardly any experiences about the indeed encourage of economic growth.

According to Albritton et. al (2010), exploitative and predatory characteristics of neoliberal business affairs enhance international criticisms. The author refers to studies, which emphasize a world characterized by nonviable national economies in combination with ungovernable entities characterized by chaos causing a rising stream of “stateless” refugees. The goal of former economic theories – the realization of the wealth in the middle-class got replaced by portending a future scenario in which half of the world’s urban society will be living in slums. The future of today’s youth at the age between 15 and 24 is especially characterized by a bleak character, not only because around 50 percent of the

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one billion young people worldwide are currently living under poor conditions (Albritton et. al 2010).

Data of the increasing inequality prove how the richest percent of the western populations increase their wealth at the cost of the other 99 percent of their own societies which in contrast had to accept mostly significant cutbacks in their salary, the fate of unemployment and poverty (Stieglitz 2013). Occasionally due to this reason, contemporary economic structures or outgrowths such as the erosion of the nation states and the correlating hegemonic shift towards global players or flexible and cheap labor in western societies have converted from economic outgrowths to the precondition of the existence of the contemporary form of capitalism and global economy (Michalitsch 2006, 52-54; Brinkmann et al. 2006).

In order to solve the fundamental excess of our civilized global society, worldwide key leaders need to take the responsibility for all of their decisions including their consequences instead of creating an artificial complex politic-economic construct functioning as a maze of confusion. Moreover, the transparency about the individuals and interest groups deciding the important societal decisions needs to be more obviously, in order to judge the responsible of the popular sovereignty. However, Löwy (2005) refers to the magnitude of the contemporary outgrowth of modern life and emphasizes that a radical change is required in order to solve the situation of our multiple crises, which concern not only production but consumption as well. In other words, the problem-solving approach is only possible if each individual as well as collective are willing to decide for the path of solving our current challenges, no matter how fundamental these decisions might reach and to overtake responsibilities for the own and collective actions in order to create broad well-being, which implies the question after the a “good life” and if a system which is based on the exploitation of national and international minor groups is capable of satisfying us in this context.

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## POOR BANK LIQUIDITY RISK MANAGEMENT AND BANK FAILURES-NIGERIAN PERSPECTIVE

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**Abstract:** *Nigeria has a long and sad history of bank failures. The problem became worse in the 1990s when many banks failed and in 2011 when several hitherto strong banks failed due to largely poor bank liquidity risk management. The Central Bank of Nigeria spent over US\$6.8bn in purchasing the non-performing loans) of the failed banks. In fact, in the last few years the Central Bank of Nigeria and the Asset Management Corporate of Nigeria have been preoccupied in a bazaar of non-performing loans. Banks as custodians of depositors funds are expected to exercise due care and prudence in their lending activities and with regard to bank liquidity risk management best practice. This study was designed to asses the relationship between poor bank liquidity risk management and bank failures. Bank liquidity risk is a risk of loss to a bank arising from a bank not having adequate funds to meet deposit withdrawals and loan demands. The survey research design was deployed for the study. Data were generated from both primary and secondary sources. Reliability for the instrument used for the collection of data was calculated at 0.93 through the Cronbach's Alpha technique. Coded data were analyzed by descriptive statistics and the Pearson's correlation methods. The result of correlation was  $r = .993^*$ , which meant that poor bank liquidity risk management has strong positive relationship with bank failures. Five recommendations were made based on the result of this study.*

**Keywords:** *macroprudential, microprudential, microfinancial, bazaar, prudential guidelines, involuntary liquidation, bridge banks.*

## INTRODUCTION

Bank liquidity theory holds that banks must hold large amount of liquid assets as reserves against possible demand for payment by depositors. This theory emphasizes the need for holding short term assets as a prudent cushion in the face of various uncertainties in banking operations and the various functions of bank liquidity. The level of liquid assets of a bank depends on the banks perceived need for liquidity. The volatility of deposits and the state of the money market as well as the level and direction of the monetary policy of the government influence bank liquidity. According to Nwankwo (1990a,1990b,1993) liquidity management focuses on the liability side of the balance sheet for supplemental liquidity. Liquidity management theory argues that since large banks can buy all the funds they need, there is no need to store liquidity on the assets side of the balance sheet. This theory assumes that increases in interest rates offered for funds will lead to increases in funds supply under a normal and stable situation, with unshaken confidence of the money market on the credit worthiness, viability and integrity of the borrowing bank. Liquidity risk management entails the construction of loan assets in such a way that outflows of funds can be accommodated without making an adjustment in liability. It involves a skilled treatment of liquidity to support the bank's loan assets or assets growth as well as maintaining a certain level of fluidity in the assets in order to meet potential demand for liquidity. Every bank has a corporate goal. The goal may be the maximization of profit for the shareholders or the maximization of their investment or total wealth in the bank. Whatever may be the objective the need to maintain adequate liquidity cannot be over emphasized. Bank liquidity risk is a risk of loss to a bank arising from the bank not having adequate funds to meet deposit withdrawals and loan demands. This risk is a very serious one since it strikes at the credibility and confidence reposed in the bank. A liquidity risk can precipitate a run on a bank. Once there is a run there is a good likelihood that the bank would be insolvent since no bank can withstand a sustained run on its deposits. To be successful bank management attempts to minimize liquidity risk and in effect losses arising there from. This is imperative because finance theory argues that there is a positive linear relationship between risk and return. By implication, the higher the risk the higher the return and vice versa. In the context of liquidity, the higher the liquidity position of a bank, the less risky is the bank, and of course the more successful the bank will be. For many years in Nigeria a good number of banks have had acute liquidity risk challenges, became distressed and eventually failed. In the 1990s for instance, most of the state governments – owned commercial banks were not only undercapitalized but were also found to be financially distressed. Bad, doubtful and lost loans, advances, and discounts (LAD) eroded the capital of many banks, and they were unable to meet depositors' demands for cash withdrawals. In spite of the financial problems, some well managed banks made profits in the 1990s. Those that failed were the ones that could not provide adequate liquidity risk management. They carried LAD exposures well in excess of their gross deposit liabilities, they equally failed to make adequate provision for their toxic assets, and also ignored disclosure requirements in relation to off-balance sheet engagements, like bonds and guarantees. Such practices tended to give false comfort and to delay the recognition of the need to enforce effective liquidity risk management that would address the problems they faced in the interest of owners, depositors and the financial system. Because of the problems posed by these adverse conditions and in order to ensure a sound financial system generally, the Central Bank of Nigeria (CBN) introduced the prudential guidelines. The prudential guidelines are the totality of the rules and regulations to be adopted for the classification of banks assets (Onoh, 2002, Sanusi, 1994, Ahmad, & Alashi, 1992). Banks as

custodians of depositors funds are expected to exercise care and prudence in their lending operations. The banks that failed in Nigeria in 2011 like the Intercontinental Bank, Afribank, Oceanic Bank, Bank PHB, Finbank, and others, like Gulfbank that failed earlier on, had liquidity risk problems. Bank liquidity risk management as a matter of fact involves a mix of different approaches since no single approach has been evolved in order to enhance either short term or long term liquidity position of a bank. Bank liquidity risk management theory believes that increase in liabilities should be made in such a way that the net rate of return on the investment of such funds remains positive. The theory is based on the idea that given an investment opportunity funds could be acquired in the money market to meet emergency investment opportunities. The liquidity of a bank could be increased through the dynamic efforts of management which involves borrowing from different sources, including interbank borrowing. According to McNutt, et al (2011), liquidity dried up during the financial crisis of 2007 – 2009. Banks that relied more heavily on core deposit and equity capital financing which are stable sources of financing continued to lend relative to other banks. Banks that held more illiquid assets on their balance sheets, in contrast, increased asset liquidity and reduced lending. Off-balance sheet liquidity risk materialized on the balance sheet and constrained new credit origination as increased takedown demand displaced lending capacity. They opine that banks should hold cash and other liquid assets as part of their overall strategy to manage liquidity risk. In modern banks, liquidity risk stems more from exposure to undrawn loan commitments, the withdrawal of fund from wholesale deposits and the loss of other sources of short term financing. Ivashina & Scharfstein (2010) show that liquidity risk exposure is not only negatively correlated with loan growth in time of crisis but it is also positively correlated with the growth in liquid assets and again the financial crisis of 2007-2009 which is the biggest shock to the US and World Wide financial system since the 1930s offers a unique challenge to both financial institutions' and regulators understanding of liquidity production and liquidity risk management. The financial crisis only abated when private capital was brought into the system. This suggests that liquidity production is central to all theories of financial intermediation, and asymmetric information processing allows banks to create liquidity through their asset transformation function (Diamond and Dybrig, 1983). Banks provide liquidity to borrowers in the form of credit lines and to depositors by making funds available on demand. These functions leave banks vulnerable to systemic increases in demand for liquidity from borrowers and at the extreme can result in runs on banks by depositors. In the traditional framework of banking, runs can be prevented or at least mitigated by insuring deposits and by requiring banks to issue equity and to hold cash reserves. Systemic increases in demand for liquidity from borrowers in contrast depend on external market conditions and thus are harder for individual banks to manage internally. For example, when the supply of overall market liquidity falls, borrowers turn to banks en masse to draw funds from existing credit lines (Gatev and Strahan, 2006). Diamond and Rajan (2001b) state that while banks provide necessary liquidity to borrowers, the loans themselves are relatively illiquid assets for banks. Consequently, when banks require liquidity they could sell the loans, in terms of existing collateral held (Bhattachaya and Thakor, 1993). According to Diamond and Rajan (2001b) banks can ration credit if future liquidity needs are likely to be high. They suggest that banks can be fragile because they must provide liquidity to depositors on demand and because they hold illiquid loans. They insist that demands by depositors can occur at undesirable times, like when loan repayments are uncertain and when there are negative aggregate liquidity shocks. Also, Kashyap, et al (2002) find similarities between some off-

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balance sheet assets and on-balance sheet assets. They suggest that an off-balance sheet loan commitment becomes an on-balance sheet loan when the borrower chooses to draw on the commitment. Bergar and Bouwman (2009) find that about half of the liquidity creation at commercial banks, occurs through these off-balance sheet commitments. Thus, banks stand ready to supply liquidity to both borrowers and insured retail depositors and can enjoy synergies when depositors fund loan commitments. Gatev, et al (2009) find that deposits effectively hedge liquidity risk inherent in unused loan commitment, particularly during periods of tight liquidity. The loan-liquidity relationship is in tandem with the commercial loan theory which postulates that a major part of the liabilities of commercial banks always has been of short term nature. Thus, the trend of acquisition of commercial banks assets should indicate a predominant position for assets of short term duration. This is based on the assumption that commercial banks should grant only loans of short-term duration and which should be productive as well as self-liquidating. Although previous studies found a relationship between bank credit risk production and liquidity risk exposure there was no specific result linking poor bank liquidity risk management and bank failures. The liquidity problems of Nigerian banks, was compounded by the incidence of low capital base. The role of bank equity capital plays a part in the liquidity provision of commercial banks. Equity capital can act as a buffer to protect depositors in times of distress especially in periods when regulators would want to increase capital levels to reduce the threat of bank failures (Gorton and Winton, 2000). Experts believe that there is a profound relationship between liquidity and profitability. Liquidity of banks in Nigeria is controlled mainly by a variation of cash reserve and liquidity ratios. The more liquid assets, especially cash, that are kept, the more resources will be kept idle, hence the lower the income that will be generated from operations. Managing bank liquidity risk therefore, entails striking a balance between meeting the customers need for liquidity and the demand to optimize interest earnings by tying down deposits on other less liquid assets such as loans, advances, and discounts. Compounding the problems of liquidity risk management is the need to monitor at all times monetary regulations involving levels of liquidity in order to be able to comply with them. Bank liquidity risk management equally entails choosing the appropriate mix of deposits that will give the greatest yield at the least cost. In doing so bank management must avoid mismatch of short term funds for long term investments. Banks liquidity needs arise from net deposit out flows. Most withdrawals are predictable because they are either contractually based or follows well-defined patterns. But most out flows are totally unpredictable. Frequently bank management does not know whether customers will reinvest maturing fixed deposits and keep the funds with the bank or out. Also, management cannot predict when loan customers will borrow against open credit lines. This uncertainty increases the risk that a bank may not have adequate sources of funds available to meet payment requirements. This risk, in turn, forces management to structure its portfolio to access liquid funds easily, which lowers potential profits. A well managed bank monitors its cash position carefully and maintains low liquidity risk. Liquidity risk for a poorly managed bank closely follows credit and interest rate risks. In many cases, banks that experience large deposit out flows can often trace the source to either credit risk problems or declined earnings from interest rate and other “casino” gambles that backfired. Sound liquidity risk management provides banks an insight on how to monitor the overall risk positions of the bank such as credit risk and interest rate risk assumed in the banks overall asset and liability management strategy. If credit risk is high, interest rate risk should be low and vice versa. Potential liquidity need must reflect estimates of new loan demand and potential deposit losses. In essence, there is frequently a positive relationship between risk and return, and vice versa. All

over the world, banks are subjected to various degrees of regulation because of their sensitive nature as custodians of funds and their ability to create money. However, in the Nigerian perspective, these controls are usually direct and purely administrative, resulting apparently, in less efficiency in the management and allocation of resources, and also the inability to provide core banking regulatory leadership. For example, in the early stages of the banking crisis in Nigeria out of 115 banks, 91 had average liquidity ratio of less than 30 percent between 1995/1996 and average liquidity ratio (ALR) of 0.49 percent bank wide. This was a major challenge that preceded huge bank failures. (Ogbodo, 1997).

In order to facilitate efficient utilization of loanable funds, every bank is expected to have a written lending policy which will incorporate guiding principles such as lending risk philosophy and strategies, loan authorization, approval procedures, desired supporting documentation, collection procedures, collateral protection against the risk of loss, et cetera. Because the loan portfolio usually represents the largest risk assets of a bank, bank examiners always undertake an appraisal of the lending operations of every bank. A major objective of such exercise is to determine the quality of the credit portfolio and make a quantitative judgment on possible risks that could lead to losses which bank management should accord due recognition with the view of protecting shareholders and the banking public. Generally speaking, the expectation of the regulatory authorities is that banks should grant loans on a sound and collectible basis in order not to jeopardize depositors' funds. But the Nigerian perspective over the years shows that banks fail to establish sound liquidity risk management, lending policies, adequate credit administration, procedures, failure to monitor lending functions within microfinancial and macrofinancial guidelines, as well as failure to maintain microfinancial discipline, that result to poor quality loan assets and the erosion of shareholders funds and bank demise. For example, the number of banks in Nigeria rose to 119 in 1991, but in 2009, the number crashed to 24, and further to 21, in 2011, including 3 bridge banks into which the Central Bank of Nigeria injected about N700bn public funds in a bailout exercise. By this exercise it meant that all of the banks had acute liquidity risk management problems. Jibueze (2014) reports that the ex-chief executive officer (CEO) of one of the banks that died in 2011 committed N62b loan fraud and money laundering. The ex-CEO is accused of fraudulently acquiring the bank PHB's shares with depositors funds. He is also accused of applying N3.5bn, being the alleged proceeds of unlawful loans granted to third parties, and using various companies as fronts with the intention to conceal the ownership of the loans. These acts run contrary to money laundering (Prohibition) Act and section 516 of the criminal code Act cap 38, laws of the Federation of Nigeria (2004). Reckless granting of loans contravenes section 7(1) (3) of the advanced fee fraud and other fraud related offences Act and punishable under section 7 (2) (b) of the Act. Omonode (2013) reports that the ex-CEO of defunct Gulf bank through the use of various faceless companies and in collaboration with both insiders and outsiders siphoned the funds of the defunct bank in excess of US\$80million. To underscore the fact that there is a positive correlation between bank liquidity and bank failures, the Federal Government of Nigeria (FGN) established the Asset Management Corporation of Nigeria (AMCON) to takeover and manage the toxic assets of the illiquid banks for effective bank liquidity risk management. The Central Bank of Nigeria determines the Cash Reserve Requirements of banks. According to Alade (2014) the Central Bank of Nigeria had in July, 2013 raised the Cash Reserve Requirement (CRR) for public sector deposits from 38 percent to 50 percent. According to her, the apex bank took time to study banks deposit

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composition before implementing the CRR policy. The CRR hike became necessary because of pockets of liquidity risk issues. Nigeria embarked on banking reforms following a debt crisis in 2008 and 2009 that brought the industry to near collapse. The Central Bank of Nigeria fired eight chief executive officers of the Nation's 24 banks and created AMCON to buy lenders bad debts and stabilize the industry. AMCON spent about ₦5.6trillion in 2011 to acquire the non-performing loans of the defunct banks. According to Obi (2013) the nation's banks have seen improvements in risk management and corporate governance, resulting in increased lending and profitability. In the banking system, liquidity risk requires close monitoring because inadequate liquidity will damage a bank's reputation while excess liquidity will retard earnings. Therefore, in measuring liquidity risk, the quality of an asset that enables it to be transformed with minimum delay into cash should be considered. In Nigeria the Central Bank of Nigeria stipulates from time to time minimum holdings by deposit money banks (DMBs) as reserves, liquid assets, special deposits, and stabilization securities. In this regard each bank ensures that its holding of these items are not less than the amount prescribed by the Central Bank of Nigeria as a measure against liquidity risk problems (Nzotta, 2004, Nyong, 1994, 1991, Gladin, 1982, Jimoh, 1993) According to Greuning and Bratanovic (2003) Liquidity is necessary for banks to compensate for expected and unexpected balance sheet fluctuations and to provide funds for growth. It represents a bank's ability to efficiently accommodate the redemption of deposits and other liabilities and to cover funding increases in the loan and investment portfolio. A bank has adequate liquidity potential when it can obtain needed funds. The price of liquidity is a function of market conditions and the markets perception of the inherent riskiness of the borrowing bank. Liquidity risk management lies at the heart of confidence in the banking system, as commercial banks are highly leveraged institutions with a ratio of assets to liabilities in the region of 20:1. The importance of liquidity transcends an individual bank, because a liquidity shortage at a single bank can have system wide repercussions. Liquidity risk management therefore addresses market liquidity rather than statutory liquidity. The implication of liquidity risk is that a bank may have insufficient funds on hand to meet its obligations. A bank's net funding includes its maturing assets, existing liabilities, and standby facilities with other institutions. It would sell its marketable assets in the stable liquidity investment portfolio to meet liquidity requirements only as a last resort. For a bank to succeed, its liquidity risk must be managed by an asset/liability committee, which must have a thorough understanding of the interrelationship between liquidity and other market credit risk exposures on the bank's balance sheet. Bank liquidity risk management policies should comprise a risk management structure, a liquidity risk management and funding strategy, a set of limits to liquidity risk exposures, and a set of procedures for liquidity risk crises situations. Liquidity needs may be met through liability sources such as stable deposit base. According to Obieri, (2014) Intercontinental bank failed mainly due to liquidity risk problems. He states: "In October, 2008, a few months after the start of the global melt down, the managing director informed the members at a board meeting of serious liquidity challenges facing the bank. The board members were not informed of any liquidity issues again until March 2009 when our liquidity problem and that of Oceanic bank became widely known, especially within the banking circle". This clear statement pushes the hypothesis that poor bank liquidity risk management leads to bank failures, because the banks in question failed. Some of the failed banks were not examined by the CBN for over 5 years, and due to poor liquidity risk management were driven into involuntary liquidation (Sanusi, 2009, Channon, 1986)

### *Statement of the problem*

Banks have frequently failed in Nigeria due to acute liquidity risk problems as a result of lack of sound bank liquidity risk management system. Banks are expected to maintain a certain level of exposure over their total deposit liabilities so as to be in a comfortable position to meet their obligations. But in Nigeria banks have often created loans and advances far in excess of their total deposit liabilities thereby becoming illiquid and unable to meet depositors' cash withdrawal demands. Because of poor corporate governance culture most of the failed banks in Nigeria created too much loans that easily became bad and irrecoverable. To make matters worse, such bad loans were not classified as required by the prudential guidelines. Banks with state governments participation and those privately owned were in most cases found wanting in disclosure requirements. Banks with government interests dished out loans on political considerations without due processes even with the deliberate intention to declaring them irrecoverable. The chairman/managing director nomenclature in the privately owned banks made it easy for bank promoters to use faceless subsidiaries to siphon depositors' funds. Available data show that people placed in executive bank positions to chart profitable paths for their banks were rather engaged in squeezing the banks dry and into total illiquidity. A situation where a bank CEO would through bad loans allegedly steal about N62b, another one US\$80m and yet another CEO N164million, just to mention few figures among others pose a huge problem for the banking system as a whole, since the liquidity risk problem of one bank affects the system, The Asset Management Corporation of Nigeria (AMCON) was created to protect shareholders, depositors and the financial system, with trillions of Naira, to acquire the non-performing loans of troubled banks in 2011. In the same year, the Central Bank of Nigeria injected about N700bn into 3 bridge banks in a liquidity risk bailout exercise with the impression that good liquidity risk management has a positive correlation with bank success. Microfinancial issues like high expenditures, fraud and forgeries, manipulation and falsification of accounting records, are among the issues that militate against bank liquidity risk management and by extension hinder banking excellence in Nigeria. To solve their liquidity problems Intercontinental bank was required to "put down" N350billion, and its managing director to refund about N164million. In the case of Afribank, the managing director was accused of conspiring with others to fleece the failed bank of about N87.5billion. Because of liquidity problems the Central of Nigeria recently closed 83 microfinance banks and 101 Bureaux du Change. Nigerian Deposit Insurance Corporation will use N105bn to pay depositors of the failed microfinance banks (Okoroafor, 2014, Onyekakeyah, 2014, Ojiabor, & Onugu, 2014, Iwarah, 2014, Uzoaga, 1981, Umoh, 1995, Adekanye, 1986, Ozigbo, 1995, Sullivan, 1988, Tricker, 1984, Zahra & Pearce, 11, 1989).

### *Delimitation of the study*

The study was delimited to Aba and its environs. The choice of Aba is unique because of the high concentration of business activities and the representation of all the banks in Nigeria in the areas.

### *Limitation of the study*

The study was constrained by lack of research grant. However, this limitation did not affect the quality and result of the study.

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## *Hypotheses*

Other scholars have written on the problems of bank crises and made valuable suggestions on how to reduce the syndrome. This study was provoked by the serious banking system problems in Nigeria and the fact that not a good number of recent studies attempted to link it directly with poor liquidity risk management. Therefore, this original study is primarily concerned with exploring the degree of relationship between poor bank liquidity risk management (PBLRM) and bank failures. The study hypothesizes that poor bank liquidity risk management has positive relationship with bank failures. To this extent, two hypotheses were formulated and tested at 0.05 level of significance to provide an examination of the empirical validity of the assumptions of the study.

Ho: Poor bank liquidity risk management has no relationship with bank failures.

Hi: Poor bank liquidity risk management has relationship with bank failures.

## **LITERATURE REVIEW**

According to Barltrop and McNaughton (1997) a very basic requirement of public confidence in the banking system is that the depositors should believe that they can have access to their funds whenever they need them. With this belief they will be confident that they are incurring no risk in depositing their money in the bank. Thus depositors are just as legitimately interested in the bank's liquidity position as are regulators, bank management and the public. A bank can avoid liquidity risk by creating mainly loans that are recoverable. Because a major source of bank liquidity problems and failure has been unrecoverable loans that were made to related companies or individuals. Loans to subsidiary enterprises, shareholders or directors and top level managers are not always made on a strictly commercial basis and represent a potential source of impairment of the bank's capital. In Nigeria many banks own subsidiaries that include non-financial companies. In such cases the bank may use deposits from the public to finance such related enterprises. And because of vested interests such loans are not always made in strict compliance with the prudential guidelines. Significant shareholders have direct influence over management of banks through the board of directors, and it is not reasonable to expect that loans to significant shareholders will be made on a fully commercial basis unless very careful prudential regulation is observed so as to minimize liquidity risk. Loans granted to top level managers in most cases become non-performing because adequate care was not employed before disbursement. Loan disbursement in state governments owned banks are hardly based on rules and regulations but rather on political considerations and expediency. Loans to this category frequently become non-performing and a serious source of bank liquidity risk for the banking sector. Re-capitalization exercise in Nigeria was to ensure the liquidity of banks to enhance successful operations. Before the re-capitalization exercise many banks in Nigeria were under severe liquidity problems. For example 26 illiquid banks were liquidated in 1998, in 2009 14 banks were also liquidated due to liquidity problems. And in 2011 the Central Bank of Nigeria injected about N700bn into the banking system to rescue banks having liquidity problems. The banks had created non-performing assets in excess of their total net worth and were unable to meet depositors demands for cash withdrawals. Some of the non-performing loans were made to shareholders through their agents, subsidiaries and significant others. Many others were created through fraudulent means that led the banks into acute illiquidity and failure.

According to Nnamdi and Nwakanma (2011) the total non-performing credits in the Nigerian banking sector increased from N21.27bn in 2002 through N260.19bn in 2003 to N350.82bn in 2004. Non-performing credits as a percentage of total credits declined from N59.38bn in 2002 to N21.59bn in 2003 and marginally rose to N23.08bn in 2004. This shows either a large increase in approved credits or an improvement in credit management over the period. However, the non-performing credit as a percentage of shareholders funds, did not portray a comforting picture. It rose from N89.17bn 2002 through N91.99bn in 2003 to N107.82bn in 2004. Shareholders funds represent total stake of stockholders inclusive of reserves and retained earnings in the banking business. The import of this scenario is that all the shareholders interests or stake in the Nigerian banking sector which should ordinarily serve as a cushion for the depositors' funds were wiped out by non-performing loans. The situation portrayed a grave liquidity risk as there was then no protection for depositors' funds in the Nigerian banking industry. Liquidity problems persisted in Nigerian banks until 2011 (Soludo, 2004, Okorie & Uwaleke, 2010). Liquidity risk rises much in the absence of assets and liability management in banks. Asset and liability management (ALM) is the management of the overall balance sheet that comprises the strategic planning and implementation and the control processes that affect the volume, mix, maturity, interest rate sensitivity, quality, and liquidity of a bank's assets and liabilities. These key elements are highly interdependent. Bank liquidity management and its associated risks are critical to bank failure or success. The central purpose of ALM is to stabilize and maximize the bank's earning potentials and at the same time ensure adequate liquidity and also to avoid risks to manageable levels. The operational aspects of ALM focus around the structures of a bank's balance sheet to ensure that the bank maintains adequate liquidity and risk profile over a certain trading period. This unique strategy and its related decisions should take into account and be able to accommodate all relevant limitations, potential distractions, and unforeseeable circumstances that would impair its success or lead to its failure. Assets and liability management makes room for quality credit risk management that involves the alignment of loan assets with total deposit liabilities. Bank liquidity is required for profitable operations, especially to sustain the confidence of the depositors', having adequate funds to meet all commitments at all times at normal market rates or interest, demonstrates adequacy of liquidity. No bank can survive in the short run without adequate liquidity. Bank liquidity risk arises when a bank is unable to undertake new transactions as desired. Bank liquidity risk is due mainly to financial mismatches in the tenure and volume of assets and liabilities resulting in losses, faulty balance sheet and cash flow structures that are unable to generate enough funds in time, at normal interest rates, to enable the bank to meet its obligations when due and undertake normal business transactions whenever desirable (Baughn, & Walker, 1978, Boffey, & Robson, 1995, Agene, 1995, Ebhodaghe, 1993, 1995, 1996, NDIC, 1990, Okpara, 1997). Cases of bank failures in Nigeria point to the reality that the culture of sound bank liquidity risk management is absent. This leads to the creation of loans without much regard to the asset and liability parity levels of banks. For example, while the capital base for banks is N25bn some bank CEOs were involved in insider deals ranging from N62bn, N87bn, through N200bn and even more, that led to the erosion of their bank's liquidity and failure. Because of loan mismatches, the ratio of non-performing loans to shareholders funds deteriorated from about 89 percent in 2002 to about 108 percent in 2004.

Poor bank liquidity risk management appetite of some directors of failed banks, especially those controlled by family members led to reckless granting of loans that ultimately resulted in losses and bank failures. For example, Onyekwere (2013) reports that some managing directors/chief

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executive officers (MD/CEOs) of some of the failed banks are still standing trail for granting questionable loans to the height of N125bn. For example, the Nigerian Deposit Insurance Corporation (NDIC) and the Economic and Financial Crimes Commission (EFCC) are at present blaming each other over how to recover insider related loans that led to the collapse of Gulf Bank. Omonode, (2013) reports that MD/CEO and other key officers of the failed bank colluded among themselves in grand and sophisticated style to the drain and collapse of the bank. The highly placed insiders most of them qualified in their respective areas engaged in serial frauds characterized by manipulation of records, suppression of information, criminal concealment, misrepresentation and forgeries of public documents all leading to colossal loss of funds to the defunct bank and unprecedented enrichment of the perpetrators; who were accused of stealing over US\$80m or about ₦13bn. This level of fraud was only made possible in the absence of sound bank liquidity risk management that continues to be a major cause of bank failures. According to Central Bank of Nigeria (2011) statistical bulletin, the Federal Government's Domestic Debt Outstandings grew from ₦2.242trn in 2009 to ₦4.139trn in 2011, indicating that the poorly managed and failed banks operated without regard to liquidity risk management best practice,

Banks as custodians of depositors' funds are expected to exercise due care and prudence in their lending activities. In order to facilitate efficient utilization of loanable funds, every bank is expected to have a written credit policy which will incorporate guiding principles such as lending philosophy and strategies, loan authorization, approval levels recovery procedures collateral protection, and credit review procedures, *et cetera*. This is very important because credit risk portfolio usually represents the largest risk asset of a bank. But experience over the years has revealed that the failure of bank management to establish sound lending policies, adequate credit management procedures, and failure to monitor lending functions within established guidelines result in poor quality loan assets that leads to liquidity problems (Okorie & Uwaleke 2010, Ugoani, 2013, Itua, 2013, Hempel, et al, 1990, James, 1987, Ademu, 1997). Fraud was eminent in the bank failure syndrome in Nigeria. Investigations show that in almost all the cases, documentations to back up loan disbursements were either absent or fake, and such undermines the liquidity status of a bank.

To maintain bank liquidity, the Central Bank of Nigeria created the AMCON in 2010 to absorb non-performing loan assets by purchasing bad debts from 21 of Nigerian illiquid banks by issuing \$6.8bn in "consideration" bonds to buy them from the institutions (Sanusi, 2014). AMCON acquired the non-performing loans with an estimated N3.3trillion, injected capital of N1.566 trillion into five banks and acquired three bridge banks for N765 billion. AMCON expects to recover its huge investment through redemption of outstanding debts when they fall due, and recoveries on non-performing loans purchased, proceeds from the sale of shares in intervened banks, proceeds from sale of AMCON – owned banks; and income generated from cash reinvestment. By this approach AMCON will maintain liquidity balance to stay afloat as a non-bank financial institution (Omonode, 2014). To reduce the problems of bank liquidity risk in Nigeria the Central bank of Nigeria now stipulates that a Mortgage Refinance Company created (MRC) in Nigeria must have a minimum paid up-capital of N5billion, or such higher amount as the Central Bank of Nigeria may prescribe, while such firm shall also maintain at all times, a minimum ratio of core capital to total assets ratio of not less than 5.0percent. "The MRC shall maintain at all times sufficient liquid assets for meeting its maturing obligations in amounts that comply with the minimum liquidity ratio as specified by the bank for licensed banks or as otherwise specified by the Bank". The guidelines state that every MRC would be required to

match-fund its long-term advances to borrowers with obligations of similar characteristics and duration so as to maintain minimal liquidity risk exposure to fluctuations in the market. The CBN states that MRC shall engage in refinancing of fully secured mortgage loans, investment in debt obligations issued or guaranteed for mortgage loans as part of its off-balance sheet engagements, issuing bonds and notes to fund its purchase of eligible mortgages, as part of arrangements by the regulatory authorities to guarantee good bank liquidity risk management for the interest of the general public. (Tayo 2014, Anunihe, 2013, Oladipo, 1993). The problem of illiquidity in Nigerian Banks due to poor bank liquidity risk management is very high. For example as at December 31, 2012, the Nigerian Deposit Insurance Corporation (NDIC) paid a cumulative N90.13billion to depositors' of 48 Deposit Money Banks (DMBs) in-liquidation. Similarly, a total of N2.50billion was paid to depositors of 103 liquidated Microfinance Banks (MfBs) during the same period of December 31, 2012 (Dickson, 2013). The ugly situation in the banking sector persists perhaps because the Central Bank of Nigeria's focus on bank liquidity risk issues leaves much to be desired. The Central Bank has been overwhelmed by the postulation of orthodox and unorthodox banking models, awarding and execution of other jobs, pursuing of missing monies with different government agencies that distract it from engaging properly in its core regulatory functions that includes efficient supervision and regulation of the liquidity of banks. (CBN Act. 2007, AMCON Act, 2010, Alli and Ehikioya, 2014, Isibor, 2014, Obi & Ehusani, 2014, Ebulu, 2014, Nwankwo O, 1993,1990a, 1990b, Matyszak, 2007) All bank assets have a source. This source may be owners who have invested in the banking business or it may be creditors. The greatest single group of creditors any bank has is its depositors – the people who have placed their funds with the bank on demand, savings, time, and other deposit accounts. These form part of bank liabilities. Banks often have liquidity problems and fail when they fail to maintain adequate reserves to meet depositors' withdrawal demands, because liquidity theory emphasizes that individuals and businesses deposit funds with the commercial banks and make withdrawals against their deposit as the need arises. Issues involved in bank liquidity risk management are important for banks because banks are key providers of financial information on the economy. The analysis of banking risks must take place in the context of the current status of a country's financial system, and several steps must be taken to ensure that banks operate in a stable and viable macropolicy and macrofinancial environments with solid legal, regulatory, and financial architecture that encompasses transparent disclosure and liquidity risk management. This new area which is interrelated to asset – liability management, and operational risk management, requires a sound understanding of risk – oriented prudential regulations that also include a host of requirements regarding the quality, experience, and skill of bank owners and management. On the basis of financial risk theory banks must be examined and audited regularly so as to provide accurate information for both microfinancial and macrofinancial decision – making that would result to sound bank liquidity risk management.

## **METHODOLOGY**

The survey research design was used for the study. The study sample was generated based on Yamane's formula. Data were generated on the one hand through a questionnaire based on the Likert-type scale, and on the other hand through document reviews. The respondents were selected through the simple random sampling technique to ensure that each respondent has an

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equal opportunity of being selected without any bias. The reliability of the measurement instrument was calculated at 0.93 using the Cronbach's Alpha technique. The two methods of data collection were used so as to validate data through each other. For accuracy, data were organized, filtered, and coded before they were analyzed through descriptive and correlation statistical methods. The correlation equation used was:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

-1 ≤ r ≤ 1

## PRESENTATION AND ANALYSIS OF DATA

Table 1: Banks assets quality for the last quarters of 2002, 2003 and 2004

Asset – quality indicators (%)	2002	2003	2004
Total non-performing credits (Nb)	21.27	260.19	350.82
Ratio of non-performing credits to total credits	59.38	21.59	23.08
Ratio of non- performing credits to shareholders funds	89.17	91.99	107.82

Source: Nnamdi & Nwakanma, 2011, PP. 171

Table 2: Liquidity position of insured banks

Banks	Number of banks		Average Liquidity Ratio (%)		Ratio of Net Loans and Advances To Deposits (%)		Number of Banks with Average Liquidity Ratio of less than 30%	
	1995	1996	1995	1996	1995	1996	1995	1996
Merchant	51	51	29.02	12.32	64.7	80.08	18	15
Commercial	64	64	(22.25)	(38.42)	57.6	57.4	32	26
Industry	115	115	0.49	(15.92)	58.4	60.0	50	41

Ogbodo, (1997) Liquidity versus Profitability in Banking: Managing the conflict First Bank of Nigeria Plc. Bi – Annual Review, pp 64-85.

Table 3: PBLRM factor score with bank failure variables

Variables of Interest	Respondents	X Scores (Agree)	Respondents	Y Scores (Disagree)	Total No of Responses
Fraud	9	41	35	70	44
Insider Abuse	13	59	53	106	66
Low Capital	9	41	38	76	47
Bad management	14	63	58	116	72
Poor credit Appraisal	3	14	15	30	18
Lack of proper supervision	5	23	17	34	22
Low deposit	5	23	20	40	25
Total	58	264	236	472	294

Source: Coded data of the study, 2014

Table 4: Correlations

(Using X scores and Y scores)

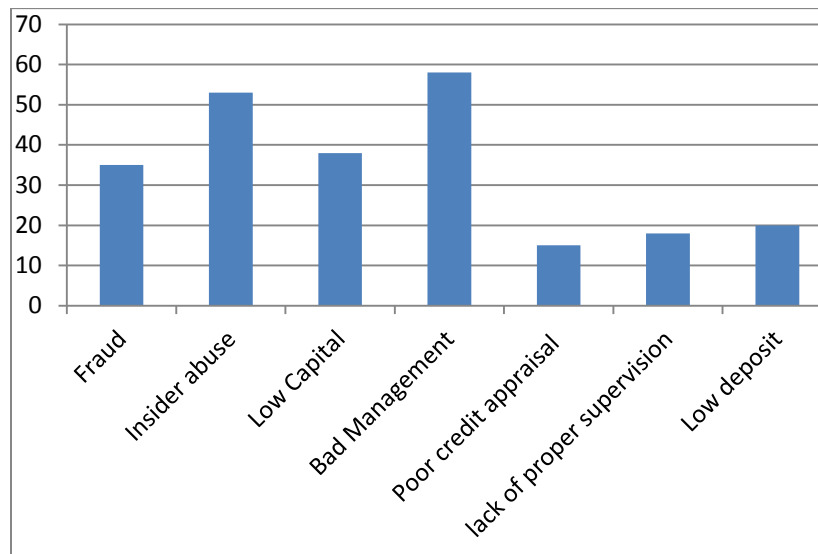
$$\bar{\Sigma}x = 264, \quad \Sigma y = (472) = 12066, \quad \Sigma y^2 = 39024, \quad \Sigma xy = 21.670 \quad n = 7$$

$$\begin{aligned}
 r &= \frac{n (\Sigma xy) - (\Sigma x) (\Sigma y)}{\sqrt{n (\Sigma x^2) - (\Sigma x)^2} \sqrt{n (\Sigma y^2) - (\Sigma y)^2}} \\
 &= \frac{7(21,670) - (264) (472)}{\sqrt{7(12,066) - (264)^2} \sqrt{7(39024) - (472)^2}} \\
 &= \frac{151,690 - 124,608}{(121.52) (224.46)} = \frac{27,082}{27,276.3792} = \underline{\underline{0.9929}}
 \end{aligned}$$

Thus the coefficient of correlation is 0.9929, since this value is close to +1, we say that there is a high degree of positive correlation between X and Y.

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Table 5: Bar Chart



The bar chart as drawn shows a positive correlation between X and Y. Since the calculated value at 0.993\* is greater than the tabulated value at 0.786, we therefore reject null hypothesis and conclude that poor bank liquidity risk management has strong positive relationship with bank failures. This is the objective of the study.

### *Discussion*

Since the creation of AMCON in 2010 Nigeria has witnessed a bazaar of non-performing loans. This is after the Central Bank of Nigeria injected about N700bn in a bailout exercise. The buying of NPLs worth N3.3trillion, the infection of N1.566trillion into five banks and the acquisition of 3 bridge banks for N765billion supports the hypothesis that poor bank liquidity risk management has significant positive relationship with bank failures. The bridge banks will serve as undertakers specifically set up to attempt to manage the assets and liabilities of the failed banks with little or no compensation to shareholders. The bridge banks are expected to meet all the obligations and commitments of the liquidated institutions that arose from poor bank liquidity risk management. To reduce bank liquidity risk problems in Nigeria, the Central Bank of Nigeria plans to devote N50billion per annum for 20 years as contributions to the Banking Sector Resolution Cost Fund as requested by AMCON. To support this arrangement commercial banks will also set aside an amount equivalent to 0.5 percent of their total assets as at the date of their audited financial statement. Even with these arrangements the CBN plans to grant AMCON a 20 year loan at 3 per cent interest rate as a lifeline to assist operations of AMCON, after the repayment of N5.6trillion debt, being the earlier amount spent by AMCON to stabilize troubled banks. To achieve the primary objectives of these arrangements the Central Bank must ensure that banks upscale bank liquidity risk management practices leading to significant contributions to the entrenchment of a risk management culture within the banks, commitment to a sound, safe and stable financial institution, through efficient management of liquidity risk. Loans granted to state governments have often become bad and irrecoverable, and more state governments are taking huge loans to assist in their development projects. (Omonode, 2014). For example, the Lagos State government debt profile stands at N435bn and the state says it has saved up to

N96bn to service the debt. With this level of debt/deposit ratio of about 5:1 there is a clear sign of liquidity risk problems ahead (Okoeki, 2014). In 2013, the Central Bank of Nigeria recorded a deficit of N89bn because total retained revenue was N252.58bn. This is an unhealthy liquidity risk management dimension at a time the apex bank is engaged in a bazaar of NPLs. Over The Counter Trading, is one of the platforms of meandering through liquidity risk management issues. (Salako, 2013, Abdulraheem, 2014, Ibrahim, 2014<sup>a</sup>, 2014<sup>b</sup>) The nationalization and liquidation of banks in 2011 would have been avoided through transparent bank liquidity risk management by both bank management and regulators. Bank regulators often make the mistake of using the prescriptive approach instead of market oriented approach. Prescriptive approach usually limits the shape of activities of the regulators and then results in attempts to promulgate same regulations for all risks known to them. The danger of this one-way approach is that regulations easily become obsolete and cannot therefore address the risks such as bank liquidity risk arising from financial engineering and innovative loan-workouts. A market – oriented regulatory philosophy believes that markets, by definition function effectively when they are capable of managing related financial risks, and allowed to operate as freely as possible. With market – oriented approach the role of the regulator is directed on facilitating the improvement of risk management process that would give adequate attention to both liquidity and credit risks that are central to bank success or failure. Liquidity risk management in Nigeria has become precarious in a situation where even the CBN cannot satisfactorily establish how much is “missing” from the national treasury (Aminu, et al, 2014). These monies are “missing” in a country with the third highest percentage of the world’s poor of about 8.03 percent, only led by India with the highest percentage of world’s poor with about 41.01 percent followed in the second position by China with about 22.12 percent of the world’s poor and a country where banks are liquidated because of illiquidity. (New Telegraphy, 2014). To a very high degree, it would seem that inept bank liquidity risk management led to the neglect of issues of both acute financial imbalances and of a structural nature that could pose risks to financial market stability and market access by potential market borrowers and this oversight did not take the Nigerian financial system and particularly, the money market to no other place than “near collapse”. To avert total collapse of the financial system as the result of illiquidity, the Central Bank of Nigeria resorted to injection of cash into the illiquid institutions which also generated some mixed feelings. Central banks intervene in the financial system to calm disorderly markets, correct misalignment and mismanagement and accumulate reserves. A major reason of Central Bank of Nigeria’s intervention in illiquid banks in Nigeria has been to raise their liquidity position. This again raised renewed public interest on how a central bank should intervene in mismanaged banks so as to maximize its own efficacy and avoid the temptation of glorifying managerial imbecility. This is imperative because the extent to which liquidity risk problems can jump around between seemingly unconnected and strong components of the financial system cannot be easily determined. Therefore while a Central Bank should provide greater liquidity to keep inter bank rates down, it should also take cognizance of the nature, quality, quantity and quantum of the banks credit risk portfolio because it frequently has a great influence on the liquidity and stability of banks.

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### *Scope for further research*

Further research should examine the relationship between bank supervision and failure in Nigeria. This may help in finding a better solution to the problem.

### *Recommendations*

- i) The money being used by both CBN and AMCON to purchase NPLs is high. The government should therefore ensure proper management of AMCON for the safety of public funds.
- ii) The NPLs being sold and bought between CBN and AMCON relate to loan largely given out fraudulently by bank promoters and directors. Efforts must be intensified at recovery and also such people should not be allowed to hold any offices whether public or private for life.
- iii) Poor liquidity risk management lies at the heart of bank failures. Banks should worry about how they extend loans to state governments because of reports of high NPLs in favour of some of them.
- iv) The CBN should concentrate on its core supervisory functions. Such will help it to catch up with distress signals in time and workout remedial actions.
- v) The Federal government of Nigeria through the appropriate agencies should disallow private banks from mopping up public funds through Initial Public Offers (IPOs). This is imperative because experience has shown that such funds were misappropriated by bank promoters for personal gains, through their multiple agents, or subsidiaries.

## CONCLUSION

Nigeria has a long and sad history of bank failures. The problem became worse in the 1990s when many banks failed and in 2011 when several hitherto strong banks failed due to largely poor bank liquidity risk management. The Central Bank of Nigeria spent over US\$6.8bn in purchasing the non-performing loans (NPLs) of the failed banks. In fact, in the last few years the Central Bank of Nigeria and the Asset Management Corporate of Nigeria have been preoccupied in a bazaar of non-performing loans. Many factors can lead to bank failures. This study therefore, attempted to assess the relationship between poor bank liquidity risk management and bank failures. Bank liquidity risk is a risk of loss to a bank arising from a bank not having adequate funds to meet deposit withdrawals and loan demands. Bank liquidity theory holds that banks must hold large amount of liquid assets as reserves against possible demand for payment by depositors. Liquidity risk management entails the construction of loan assets in such a way that outflows of fund can be accommodated without making an adjustment in liability. Almost all the liquidated banks in Nigeria had liquidity problems caused by poor bank liquidity risk management. Some CEOs of the failed banks were alleged to have conspired with others to fleece their banks of liquidity, and it is strongly believed that they voluntarily drove their banks into involuntary liquidation. Banks as custodians of depositors funds are expected to exercise due care and prudence in their lending and assets and liabilities management functions. But the Nigerian perspective shows that the failure of bank management to establish and monitor lending and liquidity risks have contributed to bank failures. For example, the defunct Intercontinental bank had acute liquidity risk challenges and in order to come out of the woods was required to

“put down” N350bn, and its managing director to refund about N164bn. Liquidity risk problems persist in the Nigerian banking system. Recently the Central Bank of Nigeria liquidated 83 microfinance banks because they have liquidity problems. Many studies have been done in the past by other scholars in the area of banking sector distress and bank failures but not much has been done in the area of poor bank liquidity risk management and bank failures in Nigeria. The survey research design was used for the study, and data generated were analyzed through descriptive statistics and Pearson’s correlation method, in an attempt to find out if there is any relationship between poor bank liquidity risk management and bank failures in Nigeria. All bank assets have a source. This source may be owners who have invested in the banking business or it may be creditors. The greatest single group of creditors any bank has is its depositors – the people who have placed their funds with the bank in demand, savings, time, and other deposit accounts. These form part of bank liabilities. Banks often have liquidity problems and fail when they fail to maintain adequate reserves to meet depositors’ withdrawal demands, because liquidity theory emphasizes that individuals and businesses deposit funds with the commercial banks and make withdrawals against their deposits as the need arises. Issues involved in bank liquidity risk management are important for banks because banks are key providers of financial information on the economy. The analysis of banking risks must take place in the context of the current status of a country’s financial system, and several steps must be taken to ensure that banks operate in a stable and viable macropolicy and macrofinancial environments with solid legal, regulatory, and financial architecture that encompasses transparent disclosure and liquidity risk management. This new area which is interrelated to asset – liability management, and operational risk management, requires a sound understanding of risk – oriented prudential regulations that also include a host of requirements regarding the quality, experience, and skill of bank owners and management. On the basis of financial risk theory banks must be examined and audited regularly so as to provide accurate information for both microfinancial and macrofinancial decision – making that would result to sound bank liquidity risk management. Sound bank liquidity risk management is important for a sound banking system. This study showed that almost all the failed banks ignored the best practice culture with regard to assets and liabilities and bank liquidity risk management that led to massive bank losses in 1990s and 2011. The present bazaar of NPLs at huge costs is never the best approach, rather banks should be made to comply with bank liquidity risk management best practice that would lead to a sound, safe and profitable financial system. With the value of correlation  $r = .993$ , it was found that there is a “strong” positive relationship between poor bank liquidity risk management and bank failures. This is the crux of the study.

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# IMPACT OF FULL-GOODWILL METHOD OF ACCOUNTING FOR BUSINESS COMBINATIONS ON TRANSPARENCY AND RELIABILITY OF FINANCIAL STATEMENTS

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**Abstract:** *Accounting goodwill arises as a result of business combinations and appears in a consolidated balance sheet of an acquirer. It is an intangible asset which reflects an excess of value of an acquired business as a whole over a summed value of its identifiable net assets. Since 2010 the International Financial Reporting Standards allow for two alternative methods of measuring goodwill in those business combinations, where an acquirer obtains a control over a target company without obtaining 100% share in its shareholder's equity. Under one of these methods, which is called a „full-goodwill method”, the goodwill attributable to non-controlling interests in subsidiary is measured at fair value. Thus, the main accounting problem with this method lies in its requirement to estimate the fair value of non-controlling interests. In this paper I argue that the “full-goodwill method” sacrifices financial statement reliability for its alleged relevance, with significant potential for “creative accounting”. The problems with reliability and transparency of financial statements, when „full-goodwill method” is applied, are illustrated by a real-life example of the takeover of Formula Systems Ltd. by Asseco Group (one of the biggest IT companies in Europe, listed on the Warsaw Stock Exchange).*

**Keywords:** *goodwill, business combinations, fair value accounting*

**JEL Classification:** *M41, M42*

## Introduction

Goodwill is an intangible asset that is typically paid for in a business combination when the consideration paid to acquire the target company exceeds the fair value of the target's net assets (Robinson et al., 2012). Thus, goodwill reflects an excess of the value of a company as a whole (i.e. as an organized business) over the summed value of its individual identifiable assets and liabilities. Under International Financial Reporting Standards (IFRS), when a company acquires another company and records part of the acquisition price as goodwill, the goodwill is capitalized as an asset and no periodic amortization charges are taken against it. Instead, companies must evaluate goodwill and other acquired intangible assets for impairment annually or whenever events or changes in circumstances indicate that the value of such an asset is impaired.

This paper discusses one of the accounting problems with measurement of goodwill in cases where an acquirer obtains control over the target company without obtaining 100% ownership in its shareholders equity. In such instances, there are two broad categories of

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subsidiary's shareholders: a controlling entity, which consolidates the subsidiary's financial results and net assets in its consolidated financial statements, and non-controlling interests, also known as minority interests. Chart 1 presents a hypothetical example of such shareholding structure.

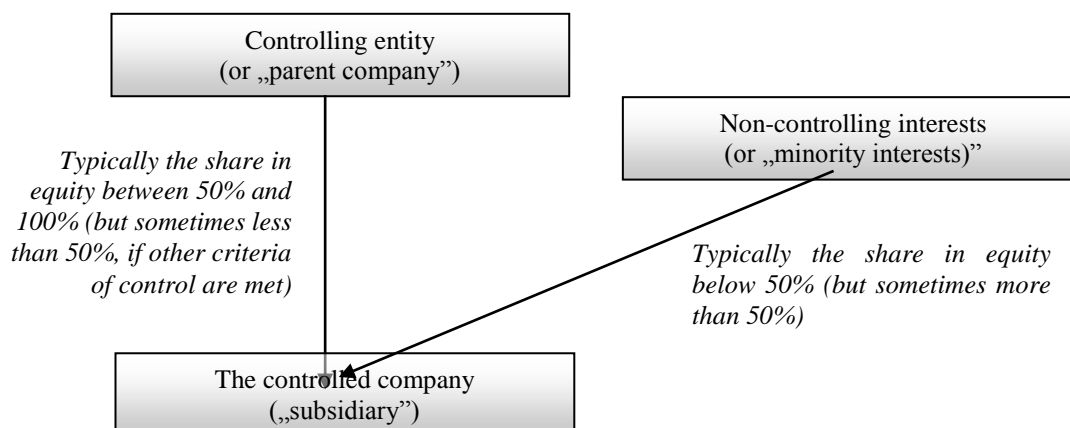


Chart 1: A hypothetical example of a control of a parent company over its subsidiary without full ownership of the subsidiary's shareholder's equity.  
Source: author.

In business combinations (also called mergers and acquisitions), resulting in ownership structures similar as depicted on Chart 1 (i.e. with non-controlling interests in the subsidiary's shareholder's equity), two alternative approaches to measuring non-controlling interests and related goodwill are permitted under IFRS. Under one of these approaches, called "full-goodwill method", the non-controlling interests may be measured with an application of subjective valuation techniques. I argue in this paper that significant dose of discretion and subjective judgments inherent in the "full-goodwill method" may erode the reliability and transparency of consolidated financial statements, particularly in case of companies engaged in multiple business combinations.

The paper is organized as follows. In the following section the principles of measuring goodwill under IFRS are summarized. Then I discuss the main accounting problems stemming from fair value estimates required by "*full-goodwill method*" and the impact of that method on credibility and transparency of financial statements. Next, the problems with reliability and transparency of consolidated financial statements resulting from "*full-goodwill method*" are illustrated by a real-life case-study of Asseco Group (one of largest IT companies in Europe). The paper closes with concluding remarks.

## Measurement of goodwill under International Financial Reporting Standards

Paragraph 32 of IFRS 3 states that the acquirer shall recognise goodwill as of the acquisition date measured as the excess of (a) over (b), where:

- a) The aggregate of:
  - (i) The consideration transferred measured in accordance with the Standard,
  - (ii) The amount of any non-controlling interest in the acquiree measured in accordance with the Standard,
  - (iii) In a business combination achieved in stages, the acquisition date fair value of the acquirer's previously held equity interest in the acquiree.

- b) The net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed measured in accordance with the Standard.

Thus, according to paragraph 32 of IFRS 3, in the case of shareholding structures similar as shown on Chart 1, an initial recognition of goodwill requires measurement of value of any non-controlling interests in an acquired subsidiary.

Until 2010 the IFRS allowed for only one method of computing goodwill resulting from business combinations with non-controlling interests. Namely, the goodwill was computed as the simple difference between the consideration paid for the controlling interest and the acquirer's share in the fair-value of net assets of a target company. It meant that goodwill presented in the consolidated assets reflected only that part of the full goodwill which is attributable to the acquirer and excluded any goodwill attributable to the non-controlling interests. This approach to computing goodwill is still permitted under IFRS (as one of two alternatives) and is called a "partial-goodwill method". On the opposite side of the balance sheet this method resulted in recognizing the non-controlling interests (reported in consolidated shareholders' equity) at the value equal to the share of these non-controlling interests in the net assets of the acquired entity.

However, since 2010 the IFRS allow for the alternative approach, called a „full-goodwill method”, which was already permitted before by US GAAP. Under this approach the goodwill is recognized in the consolidated assets at its full value and includes both the goodwill attributable to the controlling as well as the non-controlling interests. As a result, under this approach the carrying value of goodwill is higher, because it covers the full goodwill and not only its part attributable to the acquirer. However, given that now the total consolidated assets of an acquirer are valued higher than under the “partial-goodwill method” (as a result of higher goodwill), also the „right-hand side” of the balance sheet must be valued higher. This boost of the goodwill on the asset side is “plugged” by the increase of the carrying amount of the non-controlling interests, which results in boosting the total consolidated shareholders' equity of the acquiring company.

However, a significant accounting problem may arise under the “full-goodwill method”, because the carrying value of non-controlling interests must be measured somehow. According to IFRS 3, under the “full-goodwill method” the non-controlling interests in the subsidiary are to be measured at fair value. If the subsidiary's shares are listed on an active market, then this measurement is rather simple. In such cases the fair value should be determined on the basis of the market prices for shares not acquired by the parent company. However, if the market prices are not available (e.g. when a subsidiary is not a public company or if its shares are listed on a market with poor liquidity), a valuation techniques must be used (Alfredson et al., 2009). In contrast, under the “partial-goodwill method” the non-controlling interests (and the related goodwill) are measured at their proportionate share in the acquiree's identifiable net assets (which are less prone to valuation issues).

The choice of method to measure goodwill and non-controlling interests (the “partial-goodwill method” vs. the “full-goodwill method”) should be made separately for each business combination, rather than as an accounting policy. In making this election, management should carefully consider all factors, since the two methods may result in significantly different amounts of goodwill recognized (Mackenzie et al., 2012). Thus, it is possible that a company applies different accounting approaches for measuring goodwill resulting from different business combinations.

### **Fair-value accounting issues related to the “full-goodwill method”**

The main accounting problem with the “full-goodwill method” lies in its reference to the fair value of goodwill attributable to non-controlling interests. While under the “partial-goodwill method” the non-controlling interests are calculated in a rather objective and non-manipulative way, under the “full-goodwill method” they may be estimated (and overstated) with the use of the subjective valuation techniques.

According to IFRS 13 (*Fair Value Measurement*), to the extent possible, fair value should be based on an observable market price of an asset in question. In such cases the estimate of fair value is considered to be objective, verifiable and immune to manipulations. Thus, it satisfies the reliability principle. However, in those instances where such a market price is unavailable, the determination of fair value must rely on valuation techniques. According to IFRS 13, such valuation techniques should have a strong bias towards the use of observable rather than unobservable inputs, as these are considered more objective and more likely to be taken into consideration by market participants than unobservable inputs.

IFRS 13 provides a fair value input hierarchy to serve as a framework for classifying valuation inputs based on the extent to which they are based on observable data. According to this hierarchy there are following three levels of inputs:

- **Level 1 Inputs (Directly Observable)** – Quoted prices in active markets for identical assets or liabilities that the reporting entity has the ability to access at the measurement date,
- **Level 2 Inputs (Indirectly Observable)** – Directly or indirectly observable prices in active markets for similar assets or liabilities, quoted prices for identical or similar items in markets that are not active, inputs other than quoted prices (e.g. interest rates, yield curves, credit risks, volatilities) or “market corroborated inputs”,
- **Level 3 Inputs (Unobservable)** – Inputs that are unobservable and that reflect management’s own assumptions about the assumptions market participants would make.

If Level 1 is not available, the estimate of fair value should be determined by adjusting observable prices of market transactions for similar assets or liabilities that occur at or near the measurement date. In the case of shares of companies it calls for techniques of relative (or comparative) valuation, which are usually based on accounting multiples (e.g. price-to-earnings, price-to-book-value or price-to-sales). These approaches, although more immune to manipulations than techniques involving Level 3 inputs, are vulnerable to multiple subjective judgments. Among the relevant choices that must be made here are:

- Types of valuation multiples which are used (e.g. based on earnings or on book values of equity),
- Whether valuation is done on the basis of only historical accounting numbers (e.g. past earnings) or with the use of forecasted financial results,
- Whether valuation involves simple statistical tools (e.g. medians) or more advanced approaches (e.g. multiple regression of valuation multiples),
- Weights applied to results obtained from different valuation multiples,
- Number of companies serving as comparables (“peers”).

As a result of these necessary choices the application of relative valuation techniques is heavily subjective and vulnerable to manipulations.

If neither Level 1 nor Level 2 is available, the estimate of fair value should be determined using other valuation techniques (Alfredson et al., 2009). For shares of companies

it typically means discounted cash flow valuation techniques, which are heavily exposed to multiple subjective assumptions, including (among others):

- Assumptions about future macroeconomic and industrial conditions,
- Assumptions about future revenues, expenses and net assets of the valued entity,
- Discount rates used in discounting forecasted cash flows.

Of all the valuation approaches applied in valuing businesses, the techniques involving significant load of Level 3 inputs are considered the most vulnerable to manipulations.

In certain situations, such as when using Level 1 inputs, use of a single valuation technique is sufficient. In other situations management may need to use multiple valuation techniques. According to IFRS 13, when doing so, the results yielded by applying the various techniques are to be evaluated and appropriately weighted based on judgement as to the reasonableness of the range of results. The objective of the weighting is to determine the point within the range that is most representative of fair value. Clearly, such weighting constitutes another factor increasing the vulnerability of fair value estimation to manipulations.

There are two views of the consequences of fair value accounting of unverifiable assets (Paananen, 2008). One view is that discretion inherent in fair value estimates provides the management of companies with an opportunity to disclose private information to investors, lowering information asymmetry. The alternative view is that the discretion introduced provides an opportunity to manipulate the financial reporting and thereby making it harder for investors to predict future cash flows.

To sum up, when fair value estimates are based on observable prices of valued assets from active markets (Level 1), they are verifiable and relatively unsusceptible to opportunistic use. In contrast, fair values which are not based on prices from actively traded markets (Level 2 and Level 3) are unverifiable and can increase the likelihood of opportunistic disclosure (Holthausen and Watts, 2001; Ramanna and Watts, 2007). Unfortunately, many business combinations are takeovers of private companies (often small and incomparable to other entities), in which case none market prices are observable. This creates a room for manipulating fair value estimates, resulting in misreported goodwill and acquirer's total shareholder's equity. Furthermore, as will be illustrated later by a real-life example of takeover of one listed company by another public firm, acquirers sometimes use inputs other than Level 1 even for valuing shares which do have quoted market prices (without any justification for such practice offered in an acquirer's annual report). Thus, in the author's opinion, the "full-goodwill method", with its susceptibility to accounting manipulations, sacrifices financial statement transparency and reliability for alleged relevance, with the significant potential for the "creative accounting".

### **Impact of misreported goodwill under "full-goodwill method" on credibility of financial statements**

According to paragraph 27 of IAS 27, the non-controlling interests are to be identified and presented within consolidated equity, separately from the parent shareholder's equity. That is, they are regarded as an equity contributor to the group, rather than a liability of the group (Alfredson et al., 2009).

Given that the non-controlling interests are reported under IFRS as part of acquirer's consolidated shareholders' equity, the "full-goodwill method" provides a room for boosting and overstating that equity (when fair value of goodwill attributable to the non-controlling

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interests is deliberately overvalued). Prior research found that accounting goodwill is valued by investors as an asset (Barth and Clinch, 1996; Jennings et al., 1996; Vincent, 1997) and that investors react more strongly to financial statement disclosures about separately recognized intangibles than they do to goodwill (Pozza, 2007). The other studies found that investors tend to systematically overvalue firms with overstated goodwill and that they do not fully anticipate predictable goodwill impairments (Li and Sloan, 2014). This may motivate managers to boosting goodwill. Furthermore, subjectivity inherent in procedures for testing goodwill for impairment brings about long delays (up to several years) of goodwill impairment announcements (Hayn and Hughes, 2006). However, when the impairment of overstated goodwill is finally announced, it has a strong negative impact on stock prices, particularly for firms with relatively high proportion of goodwill to total assets (Li et al., 2010; Li et al., 2011). Thus, the subjectivity of estimates embedded in the “full-goodwill method” may cause significant stock mispricing and earnings surprises.

An overstatement of shareholders’ equity possible under the “full-goodwill method” results also in an understatement of the acquirer’s indebtedness ratios. Thus, it not only distorts an equity valuation, but also erodes the usefulness of credit risk analysis tools. In leveraged takeovers, particularly when an acquirer buys significantly less than 100% of shares in target’s shareholder’s equity, this method (when abused) creates a possibility of significantly *lowering* the consolidated indebtedness, despite *borrowing* for acquiring the controlling interests (if only the non-controlling interests are valued high enough).

The problems with the reliability and transparency of consolidated financial statements when the “full-goodwill method” is applied are illustrated in the following section with a real-life example from the Polish stock market.

### Real-life case-study of the “full-goodwill method”

Practical problems with the reliability and transparency of financial statements, when the „full-goodwill method” is applied for accounting for business combinations, will be illustrated by a real-life example of takeover of Formula Systems (1985) Ltd. by Asseco Group. Asseco Group is one of ten largest IT companies in Europe and is listed on the Warsaw Stock Exchange, while Formula Systems is the IT company headquartered in Israel and listed on NASDAQ.

Table 1 contains an extract from Note 9 to Consolidated Financial Statements of Asseco Group for the year ended 31 December 2011, referring to the acquisition of Formula Systems shares. Table 2, in turn, presents the computation of a goodwill arising from that business combination, resulting from an application of the “full-goodwill method” as disclosed by Asseco Group. The following essential conclusions may be inferred from these extracts:

- 1) in November 2010 Asseco Group took control over Formula Systems by acquiring 49.19% share in its equity, which gives 50.66% of votes at the Shareholders General Meeting,
- 2) the non-controlling interests in Formula Systems Ltd. have been valued at fair value (thus, the “fool-goodwill method” has been applied),
- 3) the purchase price paid for the controlling shares (49,19%) equalled 409.9 million PLN (139.1 million USD), while the non-controlling interests have been *valued* at 1,099.7 million PLN (373.2 million USD).

Although Asseco Group purchased less than 50% share in a target’s equity, this investment gave it over 50% of votes at the Shareholders General Meeting. Thus, there is no reason to claim that the criteria for control are not met. However, according to the

information shown in Table 2, the non-controlling interests in Formula Systems (which in fact are majority interests, with their 50,81% share in a target's equity) were recognized in the consolidated equity of Asseco Poland at 1.099,7 million PLN (373.2 million USD). This is the estimated fair value of slightly more than 50% share in the target's equity (and only 1,6 percentage point more than the interest acquired by Asseco Group), which does not give the control over the target company. It seems, therefore, that these non-controlling interests should be worth rather less (and not more by 168%) than the controlling interests purchased by Asseco Group, because of the possible inclusion of a control premium in the per-share fair value of the controlling interest (Mackenzie et al., 2012).

Table 1: Extract from Note 9 to Consolidated Financial Statements of the Asseco Group for the year ended 31 December 2011.

**9. Restatement of comparative data due to a change in the initial recognition of obtaining control over the Formula Systems Group**

On 25 November 2010, Asseco Poland obtained control over Formula Systems (1985) Ltd. as a result of effective acquisition of a 50.66% voting interest and a 49.19% equity interest in Formula Systems (1985) Ltd. from Emblaze Ltd. Goodwill arising from the purchase of Formula Systems shares, as disclosed in the financial statements for the year ended 31 December 2010, was estimated on the basis of provisional values of identifiable assets, liabilities and contingent liabilities. Up till 31 December 2011, following the completion of the purchase price allocation process, the estimated goodwill arising from the acquisition of Formula Systems Group was changed. Concurrently, we decided that the non-controlling interest resulting from this transaction shall be carried at fair value.

Source: Consolidated Financial Statements of Asseco Group for the year ended 31 December 2011.

Table 2: Goodwill resulting from takeover of Formula Systems Group, computed under the full-goodwill method by Asseco Group.

	Fair value as at the acquisition date	
	USD millions	PLN millions
Total assets	450.7	1,328.1
Total liabilities	245.9	724.6
Total price (A)	139.1	409.9
Non-controlling interests at the date of obtaining control at fair value (B)	373.2	1,099.7
Net assets at the date of obtaining control (C)	204.8	603.5
Goodwill at the date of obtaining control (A + B – C)	307.5	906.1

Source: Consolidated Financial Statements of Asseco Group for the year ended 31 December 2011.

Clearly, such strikingly high valuation of the fair value of non-controlling interests, as compared to the consideration paid for acquiring controlling shares, calls for an analytical scepticism and rigorous investigation of any disclosures relating to the valuation techniques and underlying assumptions applied by the acquirer (or its advisors) in this valuation. In particular, it is interesting whether Level 2 or Level 3 inputs were applied, and if yes, what were the assumptions taken.

Formula Systems is listed on NASDAQ. This fact immediately calls for valuing the non-controlling interests in its shareholder's equity at the market price of its common stock on

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acquisition date (unless convincing arguments are found for claiming that its shares are not actively traded and thus their market price does not constitute a reliable proxy for fair value). Unfortunately, Asseco Group in its Annual Report for 2011 has not provided any disclosures about the valuation methods and inputs (e.g. quoted prices, relative valuation or discounted cash flows) which have been used in valuing the non-controlling interests in Formula Systems. However, as may be concluded from data provided below, for some unknown reasons the fair value estimate was not based on the target's stock prices as quoted on NASDAQ (without any explanation offered by Asseco Group on why it neglected the objective and easily available Level 1 inputs when doing that valuation). Thus, it seems to be a good illustration of how the "full-goodwill method", although permitted by the IFRS, may significantly reduce the reliability and transparency of the consolidated financial statements.

In order to evaluate the impact of such apparently high valuation of non-controlling interests in Formula Systems on Asseco Group's total consolidated shareholder's equity, the following analytical adjustments have been made to the numbers reported by Asseco Group:

- the fair value of the non-controlling interests, as valued and reported by Asseco Group, has been replaced by its market value (Level 1 input), consistent with the actual market price of Formula Systems' stock on NASDAQ at acquisition date (i.e. November 25, 2010),
- the fair value of the non-controlling interests, as valued and reported by Asseco Group, has been replaced by the non-controlling interests' proportionate share in Formula Systems net assets at acquisition date (consistent with the "partial-goodwill method").

Table 3 and Table 4 contain the respective computations of both alternative carrying amounts of non-controlling interests in shareholder's equity of Formula Systems. As might be concluded from Table 3, the fair value estimate based on the observable and objective stock price quotations (113.4 millions USD on acquisition date) is lower by as much as 69,6% from the alleged fair value (estimated with the use of undisclosed assumptions) as reported by Asseco Group (373.2 million USD). The carrying amount of these non-controlling interests as computed in accordance with the "partial-goodwill method" (Table 4) is even lower and equals 104.1 millions USD (less by 72,1% than the reported fair value).

Table 3: Carrying amount of non-controlling interests in Formula Systems at their market value (Level 1 input).

Weighted-average number of Formula Systems shares outstanding at the end of 2010 (A)	13,282 thousands
Closing price of Formula System stock on NASDAQ at acquisition date (B)	16.80 USD
Non-controlling interest's share in shareholder's equity of Formula Systems (C)	50,81%
Carrying amount of non-controlling interests in Formula Systems valued at the market stock price (A x B x C)	113.4 USD millions

Source: author's computations on the basis of information from Consolidated Financial Statements of Asseco Group for the year ended 31 December 2011, Annual Report of Formula Systems (1985) Ltd. for the fiscal year ended December 31, 2010 and *finance.yahoo.com*.

Table 4: Estimation of a carrying amount of non-controlling interests in Formula Systems at their share in Formula Systems net assets (the “partial-goodwill method”)

Formula Systems net assets at the date of obtaining control	204.8 USD millions
Non-controlling interest’s share in shareholder’s equity of Formula Systems	50,81%
Carrying amount of non-controlling interests in Formula Systems valued at their share in Formula Systems net assets	104.1 USD millions

Source: author’s computations on the basis of information from Consolidated Financial Statements of Asseco Group for the year ended 31 December 2011.

Table 5 offers a comparison of the reported amount of the non-controlling interests and related goodwill with its two alternative estimates. Table 6, in turn, compares the Asseco Group’s total consolidated shareholder’s equity (as at the end of 2010) under these three approaches to valuing non-controlling interests. As might be seen, under both alternative options the consolidated shareholder’s equity is lower by over 12% from its reported amount. Although this effect may not seem dramatic, it must be kept in mind that this is an estimated impact of a single business combination (out of several takeovers finalized by Asseco Group in the course of the last couple of years). In case of serial acquirers (i.e. companies following a strategy of overtaking many other businesses) a managerial discretion embedded in valuing fair value of non-controlling interests under the “full-goodwill method” may bring about much more severe overstatement of the consolidated shareholders equity.

Table 5: Goodwill resulting from takeover of Formula Systems Group computed in accordance to three alternative approaches to valuing non-controlling interests.

Amounts in USD millions	Full-goodwill		Partial-goodwill
	method		method
	Non-controlling interests at fair value (as reported by Asseco Group)	Non-controlling interests at market price of Formula Systems stock at acquisition date	Non-controlling interests at their share in Formula Systems net assets
Total price (A)	139.1	139.1	139.1
Non-controlling interests at the date of obtaining control (B)	373.2	113.4	104.1
Net assets at the date of obtaining control (C)	204.8	204.8	204.8
Goodwill at the date of obtaining control (A + B – C)	307.5	47.7	38.4
Difference to reported goodwill and non-controlling interests in USD millions (PLN millions)	-	-259.8 (-765.6)	-269.1 (-792.9)

Source: author’s computations on the basis of information from Consolidated Financial Statements of Asseco Group for the year ended 31 December 2011, Annual Report of Formula Systems (1985) Ltd. for the fiscal year ended December 31, 2010 and *finance.yahoo.com*.

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Table 6: Impact of full-goodwill method of accounting for takeover of Formula Systems on Asseco Group's consolidated shareholder's equity at the end of 2010.

Amounts in PLN millions	Full-goodwill	Partial-goodwill	
	method	method	Non-controlling interests at their share in Formula System's net assets
	Data reported by Asseco Group	Non-controlling interests at market value	
Amount of equity adjustment (according to Table 5)	-	-765.6	-792.9
Asseco's consolidated total equity*	6,341.1	5,575.5	5,548.2
Percent difference to the reported number	-	-12,1%	-12,5%

\* including non-controlling interests in Formula Systems

Source: author's computations on the basis of information from Consolidated Financial Statements of Asseco Group for the year ended 31 December 2011, Annual Report of Formula Systems (1985) Ltd. for the fiscal year ended December 31, 2010 and *finance.yahoo.com*.

It is also worth noting that despite such lacking transparency of Asseco Group's consolidated financial statements for 2011 (as regards its takeover of Formula Systems and related fair value measurement of non-controlling interests), the auditor's opinion to these statements (issued by Ernst & Young) lacks any qualification and any reference to the approach applied by Asseco Group in its accounting for that business combination.

## Concluding remarks

According to the empirical research (Jennings et al., 1996; Henning et al., 2000), goodwill is considered by markets to be an asset, with its value capitalized in the market value of the firm. Thus, any overstatement of reported goodwill may bring about a mispricing (overvaluation) of a company's stock. The "full-goodwill method" of accounting for business combinations allows valuing goodwill attributable to non-controlling interests at fair value. However, any fair value estimates which are not based on directly observable prices from liquid markets are prone to manipulations, due to heavy load of subjective judgments and unverifiable valuation assumptions. As shown by a real-life case study of Asseco Group, some companies use their own estimates of fair value of non-controlling interests even in cases when the market value of these interests is easily available. Furthermore, these fair value estimates, even if suspiciously high (as compared to alternative measurements), are unsupported by any meaningful disclosures about the methods and assumptions taken by a company in valuing non-controlling interests in its subsidiaries. Thus, in the author's opinion, the "full-goodwill method" of accounting for business combinations sacrifices financial statement transparency and reliability for alleged relevance, with resulting significant room for accounting manipulations.

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## TEST OF BOUNDED LOG-NORMAL PROCESS FOR OPTIONS PRICING

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**Abstract.** *Bounded stochastic processes may be occupied for modelling the underlying price in some shallow markets. Bounds can be included in the market by ceiling-floor price rule. It is useful to apply such a rule when an increase in the liquidity is needed. On the other hand log-normal process already brings some bias on the premium of options. It is possible to reduce the bias by adding more parameters like jump diffusion, stochastic volatility or regime switching. In this case closed form solutions and numerical approximations suffer from the dimension of the problem. Monte Carlo integration then appears to be unique solution for high dimensional calculations. At the same time the variance of the output of interest should be decreased in order to have confident results. The method of Importance Sampling can be used in an attempt to reduce variance. In this study we test the bounded log-normal process with Importance Sampling Monte Carlo Simulation. Our analysis is based on the theory of variance reduction and numerical results indicate that the risk neutral density should be substituted in the range of moneyness.*

**Keywords:** *Options pricing, bounded lognormal process, importance sampling, moneyness.*

### Introduction

In developed financial markets firms and individuals seek new methods to minimize the risk arises from their transactions. Options allow investors to control the risk level when included to the portfolios. Huge amount of transactions in the options market makes options pricing one of the most attractive topics. Very famous Black and Scholes (1973) model lightened options pricing process. Their assumptions have been analysed enormously. In this study we test the bounded log-normal process which is found to be restrictive in some cases.

It is impossible to specify the probability distribution of risky asset returns. Options pricing is based on a different probability space that calculations are done with respect to arbitrage free principle and risk neutral pricing. In this probability space asset price is simply an expectation of the discounted measure of its terminal value. The expectation is taken under an equivalent martingale measure which is a mapping of the original probability distribution of asset returns. Arbitrage free

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principle provides existence of an equivalent martingale measure which is not unique if the market is incomplete, Liu and Zhao (2013). It is assumed that logarithmic returns have an equivalent normal distribution in Black/Scholes model. Hence, distribution of the asset price becomes log-normal. Merton (1976) added price jumps to the log-normal process. However final model cannot prevent some bias on the premium which increases with the maturity of the option. There are two main reasons for the bias. First one is market crashes not reflected by log-normal process with constant volatility. Hull and White (1987) introduced basic solution to stochastic volatility models excluding correlation between the volatility and price of the underlying asset. Heston (1993) and Aït-Sahalia and Kimmel (2006) tried to find closed form solutions for general stochastic volatility models. Second bias effect comes from the market frictions such as transition costs and bid-ask spread of assets. Longstaff (1995) calculated implied volatility of the S&P index call options for two years and found the result that implied volatility of the S&P index options has a smile pattern. This is known as volatility smile anomaly and studied by various authors like Rubinstein (1994), Neumann (1998), Stein (1989) and Jackwert and Rubinstein (1996). Although Black/Scholes model imposes to observe the current underlying price from the market, Longstaff (1995) relaxed the underlying S&P index values and showed that it is more expensive to purchase the underlying asset from options market than the stock market. This is obviously the case of more transaction costs of options market. But Jackwert and Rubinstein (1996) showed that even the transaction costs remain constant the volatility smile happens to have different patterns for options with different underlying assets which proves that the only reason for the bias is not market frictions. Longstaff (1995) defined this basic assumption as martingale restriction. Estimating the implied index value and the implied volatility is the same as estimating the first and the second moments of the risk neutral density which is assumed to be log-normal in most cases. Hence, diversification of the model results and empirical data is mostly caused by the log-normal process itself. Neumann (1998) used two log-normal distributions as a mixed distribution to fit empirical data better. Neumann (1998) calculated the parameters of the mixed log-normal distribution with the least squares error technique so as to minimize the diversification. Most of the articles in the area refer to the term selected for the input data. Then the analysis gets dependent to the market events. The contribution of our study is that we do not use empirical data to test the risk neutral density.

Other advances to come up with the bias of Black-Scholes model are based on regime switching models. Bastani et al, (2013) study on American options with a radial basis collation method. Boyle and Draviam (2007) studied on exotic options under regime switching model. Liu and Zhao (2013) deal with lattice methods for two underlying assets in regime switching model. Single risk-neutral density is not enough to represent the dynamics of option prices. Therefore randomly changing combination of Lévy processes included to the models. Brownian motion is the only Lévy process having continuous patterns. On the other hand, regime switching models with general Lévy processes are discrete realizations of the actual process whose states are determined by a continuous time Markov chain. Thus, it is allowed to specify long run equilibrium probabilities. The rate of return of the regime switching model which consists of a number of Lévy processes with different parameters converges to the expected risk neutral return.

Remainder part of the paper is organized as follows. Section 2 is devoted to the options pricing basis with log-normal process. Section 3 is devoted to the Monte Carlo integration framework and Importance Sampling technique. Section 4 is

concerned with numerical study. Firstly key factors in our simulation model are defined. Then numerical results are discussed and compared in the sense of variance reduction capability. And statistical test results are displayed next. Finally concluding remarks are set.

## Options Pricing in Closed Form

Black and Scholes (1973) model is based on the main assumption of normal distributed logarithmic returns. The underlying asset price follows a geometric Brownian motion which is also called log-normal process. Then underlying price dynamics were reflected by a partial differential equation (PDE) as

$$dS_t = \mu S_t dt + \sigma S_t dW_t \quad (1)$$

where  $S_t \in Q^+$  is the spot price,  $\mu$  is annual drift,  $\sigma$  is annual volatility of underlying and  $dW_t$  is the Wiener process. One easy way to show the derivation of this PDE is as follows: For one period risky asset price can be expressed as

$$S_t = S_{t-1} u_t \quad (2)$$

where  $u \in \mathbb{R}^+$  is a random variable which includes all economic information to change the price. Next step is to have logarithm of both sides and to start from the initial state

$$\log S_t = \log S_0 + \sum_{k=1}^t \log u_k. \quad (3)$$

In equation (3) we can have all  $\log u = \xi$  a normal random variable with  $\xi \sim N(\mu, \sigma^2)$  as imposed in Black and Scholes (1973) model. As a result logarithmic price ( $\log S_t$ ) becomes a normal random variable since summation of normal random variables is also a normal random variable and  $\log S_0$  is a constant. The expectation and variance of the logarithmic price can be easily calculated from equation (3) where  $E[\log S_t] = \log S_0 + \mu t$  and  $\text{Var}[\log S_t] = \sigma^2 t$ . Hence, for stochastic normal random variable  $X_t = \log \frac{S_t}{S_0}$  standard normal  $z$  can be expressed as in the following

$$z = \frac{X_t - \mu t}{\sigma \sqrt{t}}. \quad (4)$$

and equation (4) can be arranged as

$$\log S_t - \log S_0 = \mu t + \sigma \sqrt{t} z_i \quad (5)$$

where  $z_i$  represents a random number for simulation trials. Then we have differential for both sides in equation (5) and get

$$d \log S_t = \mu dt + \sigma dW_t \quad (6)$$

where  $\sqrt{t} z_i$  is substituted with  $dW_t$  since it is a random variable satisfying Brownian motion ( $B(t) - B(0) \sim N(0, t)$ ). Finally in equation (6) differential of logarithmic price is substituted with  $d \log S_t = \frac{dS_t}{S_t}$  and equation (1) is found.

Parabolic PDE has a boundary at expiration time  $t = T$  which serves as the option price. Payoff function for call option is  $\max(S_t - K, 0)$  where  $K$  is exercise price. When  $S_t < K$  call option pays off zero. And payoff function for put option is

$\max(K - S_t, 0)$ . The prices of call option and put option was calculated by solving PDE in Black and Scholes (1973).

## Options Pricing With Monte Carlo Simulation

Option price (so called premium) is discounted value of the payoff under a risk neutral interest rate. Payoff is simply an expectation of the return determined by stochastic price vector in arbitrage free environment. In option pricing models future price of the underlying is based on a random walk. It is possible to generate underlying price vector with an equivalent martingale measure. The price is calculated with the following formula for log-normal process.

$$S_{i+1} = S_i e^{\left(r - \frac{\sigma^2}{2}\right)\Delta t + \sigma\sqrt{\Delta t}z_i}, z_i \sim N(0,1) \quad (7)$$

where  $r$  is the riskless interest rate and  $S_0$  is observed from the market. Time frame  $\Delta t$  is set in years and might have  $\Delta t = 1/252$  for working days per year in case of daily closing prices are simulated. When terminal value is identified with using equation (7) e.g European put option premium is calculated with

$$V_p(S, T) = E[e^{-rt}(K - S_t)^+]. \quad (8)$$

### Monte Carlo Integration

Monte Carlo integration technique is widely used in derivatives pricing. Many problems can be formulated as integrals over a single model distribution or highly multi-modal distributions in result of expectations which can be shown as

$$\theta_f = E_f[q(\mathbf{x})] = \iiint_{R^d} q(\mathbf{x})f(\mathbf{x})d\mathbf{x} \quad (9)$$

Where  $q(\mathbf{x})$  is a real valued function. The notation  $\theta_f, E_f$  denotes that the expectation is taken with respect to density  $f(\cdot)$  which belongs to the  $d$ -dimensional probabilistic state space  $\Omega$ . If it is hard to find a closed form solution to equation (9) Monte Carlo simulations can be warranted to provide approximate results. Simulations driven by random inputs will produce random outputs. And those random outputs are the estimation of the exact results. The accuracy of this estimation strongly depends on quality of sampling which can be improved in two ways:

- increasing the cardinality of sampling or,
- introducing some kind of selection rules that make it more representative.

The first choice is commonly known limited way whereas the second requires to be applied some special techniques explained in the next section.

### Importance Sampling as a Variance Reduction Technique

In Monte Carlo applications variance of the output random variable should be reduced without disturbing its expectation, which means smaller confidence intervals. Importance Sampling (IS) introduces definite selection rules to generate most likely

configurations to obtain more accurate values of statistical averages. Certain values of the input random variables in a simulation have more impact on the parameter being estimated than others. If these important values are emphasized by sampling more frequently, then the estimator variance could be reduced. Yön and Goldsman (2006) deal with some useful biasing methods. Hence, the basic methodology is to choose a new distribution which encourages the important values. This use of a biased distribution will result in a biased estimator. However, the simulation outputs are weighted to correct for the use of the biased distribution, and this ensures that the new IS estimator is unbiased, Broadie and Glasserman (1997). IS can be carried out as in the following way:

$$\theta_g = E_g \left[ q(\mathbf{x}) \frac{f(\mathbf{x})}{g(\mathbf{x})} \right] = \iiint_{R^d} q(\mathbf{x}) \frac{f(\mathbf{x})}{g(\mathbf{x})} g(\mathbf{x}) d\mathbf{x}, \quad (10)$$

Random samples are generated from  $g(\cdot) \in \Omega$  which is called IS density.  $g(\mathbf{x})$  enables to calculate the correction factor  $\frac{f(\mathbf{x})}{g(\mathbf{x})}$ . Correction factor is sometimes called weight function. Based on sample weights accumulated during sampling the correction factor compensates for statistical fluctuations and lead to a lower variance. In equation (10) the IS density  $g(\mathbf{x})$  should assign higher probabilities to important region while holding  $\theta_f = \theta_g$ , Yön (2007). Then the estimator can be calculated as

$$\widehat{\theta}_g = \frac{1}{N} \sum_{i=1}^N \left( q(\mathbf{x}_i) \prod_{j=1}^d \frac{f(x_j)}{g(x_j)} \right) \quad (11)$$

where  $N$  is the replication number and  $d$  is the dimension of the multivariate underlying distributions. Note that  $f(\cdot)$  and  $g(\cdot)$  are two independent densities. Finally Mean Squared Error (MSE) of the estimator is calculated in usual form

$$MSE = \frac{\sum_{i=1}^N (\theta_i - \widehat{\theta}_g)^2}{(N - 1)} \quad (12)$$

The successful IS density leads lower possible MSE. This implies that underlying stock dynamics can be represented better with an alternative IS distribution. Detailed features of IS densities was given at Yön (2007) and Broadie and Glasserman (1997).

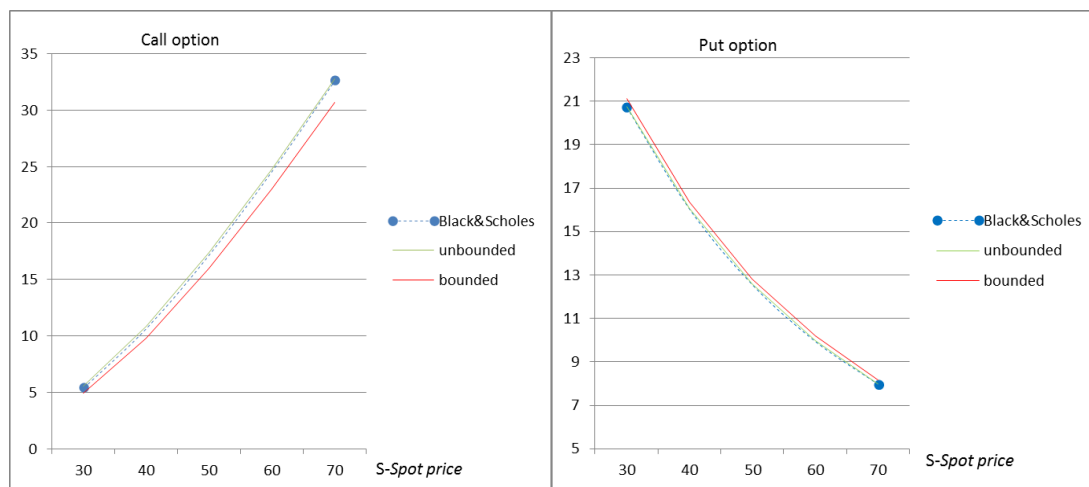
## Numerical Results

We tested bounded log-normal process from a variance reduction point of view by nominating Importance Sampling (IS) technique. We first carry out crude Monte Carlo simulation and then run IS for the same input variables. Bounded process is applied as 10% limits for up and down directions on previous day's closing price. We tried to implement a number of underlying distributions as IS densities like Gama, truncated Pareto and mixture of log-normal distributions. Numerical results indicate that it is possible to have high variance reductions for a wide range of moneyness. We fixed four input parameters as  $T = 1$  year,  $r = 10\%$ ,  $\sigma = 20\%$ ,  $K = 50$  and relaxed the spot price in the range of  $S_0 \in [30, 70]$  with unit increments. We developed an efficient C program that the simulation with one million replications takes just a few

seconds. We have results in line with predictions. Bounds make call option price lower because the increase in the underlying price is limited with bounds. Zero is already a lower bound for all assets but payoff for call is reduced with upper bound. In contrast, put option price increases with bounds because the probability of put option being worthless is reduced with upper bound. And payoff for put increases. Figure 1a and Figure 1b show the graphs of call option and put option price changes.

Figure 1a Call option price is graphed with respect to spot price. Unbounded process and Black/Scholes prices are very close whereas bounded process gives lower prices for call options.

Figure 1b Put option price is graphed with respect to spot price. Unbounded process and Black/Scholes prices are again very close. However bounded process gives higher prices for put options.



Numerical results also show that it is possible to have higher variance reduction for out-the money options. Intuitively this suggests to have different underlying distributions for different moneyness regions. Then it would be possible to reflect the underlying price dynamics better.

## Conclusions

Economic data influences prices a lot, contribution of our study is that we do not use term dependent empirical data. We used variance reduction technique and simulation to test the lognormal process. The possibility of high variance reductions shows that original risk neutral measure of log-normal distribution cannot completely reflect the underlying price dynamics. We used importance sampling in our analysis. The basic idea is to compute a correction factor to the importance sampling estimates. Better alternatives could be found by easy combination of continuous distributions. Bounded lognormal process is suitable for some markets. Both approaches could be better in the form of a risk neutral density for different moneyness regions.

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## PROFITABILITY DETERMINANTS OF BH BANKING SECTOR IN CIRCUMSTANCES OF SLOWER ECONOMIC GROWTH

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**Abstract:** *The global financial crisis and slow economic growth have had a significant impact on operations and performance of domestic banks. The crisis devastated the banking sector in general, but it also had an indirect impact on the deterioration of their profit, increase in the volume of non-performing loans, reduced liquidity and weak economic growth in general. The financial system in BH is essentially bank-centric, where more than 80 % of assets constitute assets of the banking sector. In this paper, the focus will primarily be on the analysis of key economic variables that affect only the movement of profitability parameters. The main objective of this paper is to determine whether there is interdependence in the movement between the independent and dependent variables through a multiple linear regression. The return on average assets (ROAA) will be observed as a dependent variable, and total assets of the banking sector, liquidity risk, credit risk, net interest income to total income, non-interest expenses to gross income, growth rate of GDP, Herfindahl - Hirschman Index and EBRD index will be used as independent variables.*

**Keywords:** *Profitability, Banking Sector of BH, Regression Analysis.*

**JEL Classification:** *G01, G20, G21.*

### Introduction

The financial sector in BH is mainly composed of commercial banks, credit organizations, leasing companies, investment funds and insurance companies. Entity regulations of the banking operations are harmonized, which includes the same standards of supervision or oversight of banks and uniformity of institutional requirements for banking operations in the entire financial market of Bosnia and Herzegovina. The most developed and important part of the financial market in BH is certainly the banking sector, whose assets in 2012 amounted to about 80% of the total assets of the financial sector in BH (DEP, 2012, p. 16). Supervision of the banking sector in BH is the responsibility of the two entity banking agencies. Small banks have difficulty obtaining high-quality long-term sources of funds because of their size, problem with the recapitalization, potentially weaker performance and detachment from foreign parent banks. Thus, they have a more difficult access to international, high quality sources. According to preliminary data, the overall financial result at the end of 2013 was 12.88 million Euros. The growth of negative financial results in the previous year had the

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strongest impact primarily due to a wrong policy of investing in foreign exchange reserves by the CBBH, the growth of fee expenses, and costs of reserves for the general credit risk and potential credit risks that led to the increase in the total expenditure by around 13.6% (DEP, 2013, p.22).

Differences in profitability between banks can be explained in terms of their ownership and management styles. Specifically, a comparison between private and public banks in terms of ownership implies that the state-owned banks are often less efficient than private banks (García-Herrero et al., 2009). The result of the current state is usually attributed to the fact that state-owned banks hold assets of poor quality. According to Molyneux and Thornton (1992), private banks have higher returns due to lower capitalization arising from the state of implicit underwriting of state banks.

It is assumed that banks can operate more efficiently through a more prominent role in the market and efficient management of operating costs. Profitable financial institutions aim at absorbing negative macroeconomic shocks through the identification of the determinants of profitability and higher influence of the market structure (Athanosoglou et. all, 2008). There are some small-scale studies that observed the performance of banks in developing countries. One such study is by Guru et. al (2002), which examines certain profitability performance of the banking sector in Malaysia.

In their study, they used a sample of 17 commercial banks for the period 1986 - 1995. Determinants of profitability were divided into two groups, internal determinants of profitability (liquidity, capital adequacy and expenditure management) and external determinants of profitability (ownership, firm size, and other economic conditions). Based on the research, they came to the conclusion that high profitability significantly affects effective cost management. In terms of macro indicators, high interest ratio was associated with low profitability of banks, where inflation had a positive impact on the performance of banks.

Research by Dermiguc - Kunt and Huizinga (2001) suggests that there is substantial evidence on the impact of financial development and the structure of a bank on profitability. Specifically, they used data for certain numbers of developed countries for the period 1990 - 1997. Research results showed that there is a significant effect of financial development on the performance of banks. Also, they came to the conclusion that in terms of sharper competition highly developed banks had lower performance. On the other hand, the development of the stock market and their results leads to higher profitability and margins for banks suggesting complementarity between the banking sector and the stock market. A research by Pasiourasu and Kosmidou (2007) refers to the performance of domestic and foreign commercial banks in 15 EU countries in the period of 1995 - 2001. Results of their study indicate that the profitability of domestic and foreign banks affect not only the specific characteristics, but also the structure of the financial market and macroeconomic conditions. Finally, the results of their study indicate that all variables have a significant impact and that this relationship is not unique to domestic and foreign banks.

This research is designed and presented in three sections of this paper. The first part observes determinants of profitability and selected indicators of the financial health of the banking sector in BH, which we think are important for the analysis and which is based on the same analysis of the situation in the banking sector in terms of the ability to generate profitability. The second part describes theoretical assumptions and perceptions, the regression model and gives a definition of significant independent variables that affect the profitability alone. The last part of the paper discusses the results of a personal research on the application of the regression model. In this context, it is stated that the observed independent variables have the greatest impact on the growth or decline rate of return on average assets for the banking system in BH.

## Determinants of Bank Profitability

Indicators of profitability, such as return on equity – ROE and return on assets – ROA are the most important synthetic indicators of the bank. The ROE indicator is the ratio between net profit and equity capital, and is often referred to as the yield on shareholders' equity. Unlike the yield on equity, the ROA is the ratio between net profit and total assets of the bank, and assumes rational use of a bank committed funds (Vunjak and Kovacevic, 2011, p. 389). Therefore, ROA shows profits per unit of investment that reflect the ability of management to make use of financial and real investment resources of banks to generate profit. ROA depends on the policy of the bank, as well as uncontrollable factors relating to economic trends and government regulations. Rivard and Thomas (1997) suggest that the best bank profitability is measured by ROA indicator because ROA does not impair a capital multiplier level and thus, ROA is a better measure of a company's ability to generate profit on the total portfolio assets.

If the value of the ROA indicator is less than 0,5%, the bank's profitability is considered to be bad. If it is between 0,5% and 1%, then we can say it is about average profitability, and if the value of the ROA indicator ranges between 1 % and 2%, we can certainly talk about very profitable financial institutions. An objective of the bank's management is to realize an adequate return on equity. A serious warning for banks occurs at a time when the indicator reaches ROE above 20 - 25%, which is a signal that it is necessary to reduce extreme debt in the financial markets urgently and significantly (Collier, 2009). The table below illustrates the selected indicators of the health of the banking sector in BH for the period 2006 – 2013.

Table 1 : Performance Indicators of Banking Sector in BH for the Period: 2006 - 2013 in (%)

No.	Indicators	2006	2007	2008	2009	2010	2011	2012	2013
1.	Assets/GDP	61,90	66,77	63,70	67,55	72,38	76,36	79,70	84,36
2.	Capital Adequacy	17,7	17,1	16,3	16,1	16,2	17,1	17,0	17,8
3.	Loans/Deposits	104,97	98,05	122,18	116,19	116,07	117,84	119,62	115,16
4.	Non - Performing Loans/Total Loans	4,0	3,0	3,1	5,9	11,4	11,8	13,5	15,1
5.	Net Interest Income/Total Income	54,3	59,9	60,6	61,5	60,1	63,9	63,7	62,3
6.	Net profit/average assets	0,9	0,9	0,4	0,1	-0,6	0,7	0,6	-0,2

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No.	Indicators	2006	2007	2008	2009	2010	2011	2012	2013
8.	Net Profit/ Average Equity	8,4	8,9	4,3	0,8	-5,5	5,8	5,0	-1,3
9.	Non Interest Expenses/ Total Revenues	86,5	84,9	90,5	97,4	109,0	86,5	87,2	101,0

*Source: [http://cbbh.ba/sfsi.php?id=618&lang=bs&table=&show\\_all](http://cbbh.ba/sfsi.php?id=618&lang=bs&table=&show_all) (Taken on: 21/04/2014)*

The statistics presented in the Table above indicate significant variations in the banking sector in BH. It should be noted that the role of banking financial institutions has an important place in the overall financial system in BH. Thus, it is evident that the lowest value of the share of the total banking assets in GDP was recorded in 2006 with 61,90%, while on the other hand the highest value recorded was in 2013 (84,36%). The mean share indicators of total assets of the banking sector in GDP - in the period 2006 - 2013 - amounted to 72%. The level of financial intermediation and the linear trend of the share of the total banking assets in the gross domestic product is the result of an increased credit expansion that has become the only source of financing in the financial system in BH.

The highest value of the capital adequacy ratio was recorded in 2013, (17,8%), the lowest in 2009 (16,1%) and a mean value of 16,91%, which suggests that the banking system is well capitalized and that BH has to maintain a constant high rate of capitalization and is well above the legal minimum of 12%. An indicator of a proportion of bad loans to total loans lowest value was recorded in 2007, (3,0%), and the highest value was recorded in 2013 (15,1%). A mean value of indicators of bad loans in this period was 8%. A tendency of increasing the share of non-performing loans was primarily the result of slowed economic activity and increased rates of default, because as the population loses their jobs, creditworthiness declines and thereby the total consumption and aggregate demand.

Also, in the table above it is quite clear that the lowest value of the return on average assets was recorded in 2010 (-0,6%) , while on the other hand, the highest value was recorded in 2006 and 2007 ( 0,9 % ). A mean value of indicators return on average assets for banks in BH, the same as for the period 2006 – 2013 was 0,35 % , which is generally poor profitability of the banking sector. The largest share of net interest income in the total income was in 2011, (63,9%), while the lowest proportion was recorded in 2006 (54,3 %). A mean value of the profitability indicators for the period 2006 – 2013 had a share of around 61% in net interest income in the total income. If we look at the cost side, we can see an increased tendency of non-interest expense to total income, which ranged from the smallest share of (84, 9 %) to the largest proportion of the total revenue in 2010 (109 %). A mean value of this indicator for the period amounted to almost 93 % share of costs in total revenue, total revenue burden for over 30% of non-interest expenses, which are primarily related to the costs of provision for credit risk. Regarding the indicator of return on average equity, it can be observed that the highest value was achieved in 2007 ( 89% ) , while the lowest value was recorded in 2010 (-5,5 % ) and the mean value of 3,3 % , which is a relatively low profitability.

## Data for Analysis and Methodology

The regression model is an equation with a finite number of parameters and variables. Depending on whether a model comprises of only one or more variables, there is a simple and multiple linear regression model respectively. In addition to a dependent variable and one or more independent variables, each regression model contains a random variable. A simple linear regression model expresses a relationship between two parameters as follows:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \quad i = 1, 2, \dots, n, \quad (1)$$

where:

$Y$  – dependent variable,

$\alpha$   $\beta$  – unknown parameters that need estimate, and  $\varepsilon_i$  – stochastic variable (error distances)

Unlike the simple regression, the multiple linear regression model is different in that it comprises two or more independent variables.

$$Y_i = \alpha + \beta_1 X_{i,1} + \beta_2 X_{i,2} + \dots + \beta_i X_{i,j} + \dots + \beta_k X_{i,k} + \varepsilon_i \quad (2)$$

$$i = 1, 2, \dots, n.$$

Specifically, this model consists of one dependent variable  $Y$ , and  $K$  independent variables, which are referred to as:  $X_{i,j} = 1, 2, \dots, K$ .

This empirical study refers to the total banking sector in BH for the period from 2006 to 2013. The data used for this study are the official data (statistical analysis) of the Central Bank of Bosnia and Herzegovina, Banking Agency of the FBH and Banking Agency of the Republic of Srpska. This study used a multiple linear regression model which assesses the nature and strength of a bond between a dependent variable and  $K$  independent variables that are marked with  $X_{i,j}$  ( $i, j = 1, 2, \dots, K$ ). Therefore, in this study, return on assets of the banking sector in BH (ROAA) is used as dependent variable, and the following ones as independent variables: total assets of the banking sector in BH, the ratio between loans and deposits, the ratio of loans to total assets, net interest income the total income, non-interest expenses to gross income, real GDP growth rate, the HHI index and EBRD. ROA is the most effective indicator of the banking business because it reflects the ability of the bank management to generate profit from available funds of banks. In addition, it is used as the main indicator of many empirical studies.

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Table 2: Parameters of Empirical Analysis

Variable	Description	Expected Sign
Return on Assets - ROA	After tax income/average assets	
Bank Size	Total assets of the banking sector	?
Liquidity Risk	Ratio of loans to deposits	Positive
Credit Risk	Ratio of loans to total assets	?
Profitability	Net interest income to total income	Positive
Profitability	Non- interest expenses to gross income	Negative
Economic Growth	GDP growth rate	Positive
Concentration	Herfindahl - Hirschman Index	?
EBRD Index	EBRD Index of banking sector reform	?

The Herinbahl Hirschman index is a widely accepted measure of market concentration, where the index value is obtained when market shares of every company participating in the market are individually squared and summed up. The HHI may take different values in the range from 0 to 10.000. The concentration index does not increase linearly, which means, for example, if the value is 3.000, it means that the concentration in the system is 30%. If the concentration of the index is in the interval from 0 to 1.000, it is considered a non-concentrated market, or that there is a high level of competition. If the index takes values from 1.000 to 1.800, then we can say that the market presents moderate concentration. Furthermore, if the value of the index recorded in the range from 1.800 to 10.000, then the market is concentrated, i.e. there is a monopoly. Approaching the concentration index to zero implies that the market has a large number of participants approximately of equal size. HHI increases when the market reduces the number of companies or if there is disparity in their size. So, with an increase in the market concentration, competition and efficiency are reduced, which leads to opportunities for monopoly and collusion.

The risk of insolvency is inability of banks to meet maturing obligations which may eventually lead to a loss of business. As a measure of liquidity risk, the ratio of loans to deposit is most commonly used. In order to reduce the liquidity risk, banks hold a greater amount of liquid assets, which can be easily converted to cash. On the other hand, liquid agents have lower yields resulting in lower profitability. Thus, the high liquidity (lower loanto-deposit ratio) leads to low profitability and vice versa, lower liquidity (higher ratio of loans/deposits) leads to higher profitability (Kosmidou, 2008). In addition to cost management and risk management, there is a very large impact on profitability in the banking industry. Higher amounts of capital to total assets imply lower profitability. Although higher levels of capital needs to provide a higher level of security to the bank, in the banking business a capital level should be assessed in accordance with the level of risk. The regression model in this study is presented as follows:

$$ROA = \alpha + \beta_1 * (TA) + \beta_2 * (LR) + \beta_3 * (CR) + \beta_4 * (N - T) + \beta_5 * (N - G) + \beta_6 * (GDP) + \beta_7 (HHI) + \beta_8 * (EBRD Index) + \varepsilon_i \quad (3)$$

The representativeness of the model will examine calculation of the coefficient of correlation ( $r$ ), coefficient of determination ( $R^2$ ) and adjusted coefficient of determination

( $\bar{R}^2$ ). There is also the analysis of variance (ANOVA), which will test the significance of observed financial variables in the model, where the null hypothesis is the reason why the independent variables do not significantly affect the dependent:

$$\begin{aligned} H_0 \dots \beta_1 &= 0 \\ H_1 \dots \beta_1 &\neq 0 \end{aligned}$$

The table below illustrates the descriptive statistics of the explanatory.

Table 3: Descriptive Statistics of Observed Banking Performance for the Period: 2006 - 2013

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
ROAA	32	1,5	-0,6	0,9	0,326	0,361	0,130
TA	32	11 8220.	10.216,4	22.038,4	1.674E4	3.253,17	1.058E7
LR	32	0,3	0,9	1,2	1,13	0,08	0,007
CR	32	0,2	0,7	0,9	0,81	0,52	0,003
N – T	32	13,2	52,3	65,5	60,74	3,51	12,32
N - G	32	34,2	76,7	110,9	89,75	8,80	77,49
GDP	32	6,9	-2,8	4,1	0,592	1,57	2,48
HHI	32	67	81	148	128,25	17,04	290,26
EBRD index	32	0,3	2,7	3,0	2,92	0,13	0,02
Valid N (listwise)	32	-	-	-	-	-	-

*Source: Calculation by Author (SPSS 16.0)*

Growth in total assets of the banking sector in BH, as well as the HHI index, showed their highest volatility with a standard deviation of 3.253 % and 17 % for the period from 2006 to 2013. In the first quarter of 2006, the total assets in the banking sector in BH amounted to 5,23 million Euros, while in the last quarter of the 2013, its value was 11,27 million Euros, which represents a relative increase of 115 % and the volatility of total deposits. Also, the high volatility of the HHI index creates conditions for oligopoly behaviour of a few large banks in the system, namely around five major banks control almost 80 % of the total assets of the banking sector in BH. Small banks have problems with obtaining highquality long-term

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sources of funds, problems with recapitalization, problems of independence for foreign banks, and thus a more difficult access to quality services. A small number of large financial institutions are generally characteristic of the banking market structure, so that free competition is extremely rare in the banking market in BH.

### *Research Results*

Results obtained by the regression analysis indicated that the coefficient of correlation is  $r = 0,87$ , indicating that there is a strong correlation between the dependent variable, i.e. the return on average assets - ROAA and independent variables: the total banking sector assets (TA), ratio of loans to deposits (LR), ratio of loans to total assets ratio (CR), relationship to the net interest income to total income (NT), ratio of non-interest expense to total revenue (NG), real GDP growth rate (GDP), concentration index (HHI) and the index of banking reform (EBRD index). The coefficient of determination is  $R^2 = 76\%$ , and the adjusted coefficient of determination is  $\bar{R}^2 = 0,68$ , which further shows that this model described 68% of the variations to the independent variables, making the model relatively representative. The significance test also indicates that there is a significant influence of certain independent variables on the dependent variable. Testing the null hypothesis of significance obtained statistically significant data indicated there was significant influence of certain independent variables at a significance level of  $\alpha = 1\%$ , and that the empirical F-ratio was 9,118. As for this study, the value of the empirical F-ratio (9,118) is higher than the theoretical value of F-ratio (3,41) for the 8-degree of freedom in the numerator and 23 in the denominator, then we come to the conclusion to reject the null hypothesis that the independent variables have a significant impact on the dependent variable. The DurbinWatson statistics show high correlation with respect to the value of approximately 2.

Table 4: Regression Analysis Between the Following Parameters: ROAA, TA, LR, CR, N - T, N

- G, GDP in BH for the Period 2006 – 2013

<b>Regressi</b>	<b>on Statistics</b>
<b>Multiple R</b>	0,872
<b>R Square</b>	0,760
<b>Adjusted R Square</b>	0,677
<b>Std. Error of the Estimate</b>	0,205
<b>Durbin - Watson</b>	1,99

*Source: Calculation by Author (SPSS 16.0)*

Table 5: Analysis of Variance Between the Following Parameters: ROAA, TA, LR, CR, N - T, N - G, GDP in BH for the Period 2006 - 2013

<b>ANOVA</b>	<b>df</b>	<b>SS</b>	<b>MS</b>	<b>F</b>	<b>Significance F</b>
Regression	8	3,071	0,384	9,118	0,01
Residual	23	0,968	0,042	-	-
<b>Total</b>	<b>31</b>	<b>4,040</b>	-	-	-

*Source: Calculation by Author (SPSS 16.0)*

Table 6: Matrix of Correlation Coefficients Between Parameters: ROAA, TA, LR, CR, N - T, N - G, GDP, HHI and EBRD Index for the Period: 2006 – 2013

	<b>ROA</b>	<b>TA</b>	<b>LR</b>	<b>CR</b>	<b>N - T</b>	<b>N - G</b>	<b>GDP</b>	<b>HHI</b>	<b>EBRD Index</b>
<b>ROA</b>	1,000	-0,192	-0,341	0,338	0,279	-0,820	0,069	-0,314	0,503
<b>TA</b>	-0,192	1,000	0,637	-0,129	0,835	0,110	-0,530	0,425	0,782
<b>LR</b>	-0,341	0,637	1,000	0,327	0,680	0,188	-0,424	0,284	0,806
<b>CR</b>	0,338	-0,129	0,327	1,000	0,265	0,373	-0,315	0,677	0,413
<b>N - T</b>	0,279	0,835	0,680	0,265	1,000	0,247	-0,593	0,704	0,861
<b>N - G</b>	-0,820	0,110	0,188	0,373	0,247	1,000	-0,080	0,432	0,418
<b>GDP</b>	0,069	-0,530	-0,424	-0,315	-0,593	-0,080	1,000	-0,520	-0,488
<b>HHI</b>	-0,314	0,425	0,284	0,677	0,704	0,432	-0,520	1,000	0,659
<b>EBRD Index</b>	0,503	0,782	0,806	0,413	0,861	0,418	-0,488	0,659	1,000

*Source: Calculation by Author (SPSS 16.0)*

The coefficient of correlation can take values from -1 to +1. Thus, the resulting ratio shows the strength of the two observed parameters. The value of zero indicates that there is no correlation, the value of 1,0 indicates the correlation between complete and connected, while the value of -1,0 indicates the correlation between complete and negative. The table above clearly shows that most of the explanatory variables are slightly negatively correlated, and on the other hand, it shows that the small number of observed variables have a positive correlation. Given the case analysis of the influence of independent variables on the dependent variable, and the return on average assets, it can be seen that the strongest positive correlation was observed between the return on average assets and the EBRD Index (0,503). It is quite reasonable and understandable because the banking sector reform in BH had a significant positive impact on the profitability of the banking sector. For the analyzed period, the mean EBRD Index was 2,85 with a minimum of 2,7 and a maximum of 3. According to EBRD estimates, the value of 3 means that some progress has been made in establishing a bank 's solvency, reasonable supervision and regulatory framework, liberalization of interest

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rates, significant lending to private enterprises and privately owned banks (EBRD, 2011). There was also a positive correlation (0,069 ) between the return on average assets and gross domestic product, which is quite logical, because an increase in gross domestic product directly implies growth in profitability, and higher economic growth. On the other hand, the strongest negative correlation was observed between the return on average assets and noninterest expenses to total income (-0,820). The mean ratios of non-interest expense to total revenue for the period: 2006 - 2013 was 92,87%, with a minimum value of 86,5% and a maximum value of 109%.

Table 7: Regression Analysis Coefficients Between the Following Parameters: ROAA, TA, LR, CR, N - T, N - G, GDP, HHI and EBRD Index for the Period: 2006 – 2013

Model		Non-Standard Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zeroorder	Partial	Part
	(Constant)	7.023	1,817	-	3,870	0,001	3,273	10,791	-	-	-
	<b>TA</b>	-4,926E-5	0,000	-0,444	-0,740	0,467	0,000	0,000	-0,192	-0,153	-0,076
	<b>LR</b>	1,817	1,702	-0,407	1,067	0,297	-1,704	5,338	-0,341	0,217	0,109
	<b>CR</b>	-4,373	3,928	0,633	-1,113	0,277	-12,50	3,753	-0,338	-0,226	-0,114
	<b>N – T</b>	-0,016	0,035	0,160	0,465	0,646	-0,089	0,057	-0,279	-0,097	-0,048
	<b>N - G</b>	-0,032	0,006	-0,791	-5,701	0,000	-0,044	-0,021	-0,820	-0,765	-0,582
	<b>GDP</b>	0,021	0,038	0,091	0,553	0,586	-0,099	0,057	0,069	-0,115	-0,056
	<b>HHI</b>	0,017	0,011	0,815	1,543	0,136	-0,006	0,040	-0,314	0,306	0,158
	<b>EBRD Index</b>	0,923	1,198	0,338	0,771	0,449	-3,401	1,555	-0,503	-0,159	0,079

Source: Calculation by Author (SPSS 16.0)

From the table above it is clear that the return on average assets - the ROAA has the strongest positive linear relationship to the concentration index, i.e. HHI index (0,815), followed by liquidity risk - LR (0,407) and the EBRD Index. On the other hand, the weakest linear relationship was observed at ratios of non-interest expense to total income (-0,791), credit risk - CR (-0,633) and total assets (-0,444). It is quite logical that the strongest linear relationship is between the return on average assets and the HHI index, as in the Republic of Srpska 4 to 5 major banks and five small banks operate, which hold nearly 80% of the banking market. In the Federation of BH, five biggest banks hold 74% of the total market deposits and loans (Banking Agency of the Federation of BH and the RS Banking Agency, 2013).

As the majority of non-interest expenses are the costs of provisions for general credit risks and potential credit risks, and in the first nine months of 2013, risky loans to businesses by banks in FBH amounted to 32,2% of total loans, then non-interest expenses are quite logical, as well as an inverse relationship between the movement of return on average assets ratio and the non-interest expense to total revenue. Categories of non-performing loans (categories C to E) accounted for 18,2% (at end of 2012, contribution was 15,6%) (FBA, 2013, p. 45-46). In addition to non-interest expenses, total assets had a negative value relative to the return on average assets (-0,444) as well. A growth of non-performing loans and increased risk aversion, as well as more strict requirements for granting loans, along with poor domestic demand, resulted in a decline in lending activity to businesses. Out of the total approved EUR 1,82 billion in total loans in 2013, 60% are short-term loans, whereby it can easily be concluded that enterprises in BH have problems with short-term liquidity.

Also, negative linear trends were observed between the return on average assets and liquidity risk (-0,407), which is quite justified because banks with higher loans to deposits are certainly profitable, and vice versa, banks with larger amount of liquid assets ultimately imply lower profitability. Lending rates in BH in 2012 were higher than interest rates in the Euro area (twelve EUROBOR) by about 6,59 percentage points, which affected profitable business (Central Bank, 2012, p. 94 - 98).

Total assets of banks in BH do not have such a significant impact on the profitability of the business by the analysis results. Also, the same goes for credit risk. Seen from the other side, i.e. in terms of significance of lending activity in the overall banking system, the result of the changing credit risk is contrary to our expectations. According to the results of the analysis, the profitability of banks in Bosnia and Herzegovina is under an increasing influence of the cost factor, as well as their credit activities. However, it is insignificant if one takes into account that the same costs refer to the provision for loan losses. In fact, all of the analyzed external variables have an impact on banks' profitability. The most important variable is the growth rate of gross domestic product. As it might have been expected, the rate of GDP growth has a positive (significant) impact on bank profitability, as very favourable economic conditions in terms of growing economic activity certainly contribute to an increase in household savings banks and an increasing demand for financing.

Since the non-bank financial institutions in the financial system in BH are underdeveloped, the household sector predominantly saves funds in banks. Also, the capital market in BH is inadequately developed, due to a lack of high-quality companies and low liquidity, and bank loans are the only source of company lending. Specifically, in each case, the growth of economic activity increases the demand for banking services, which ultimately increases the profitability of banks.

## Conclusion

This paper analyzes the determinants of the profitability of the banking sector in BH in the period between 2006 and 2013, using multiple linear regression models. In the quantitative analysis, we assume the return on assets of the banking sector in BH (ROAA) is used as dependent variable, and the following ones as independent variables: total assets of the banking sector in BH, the ratio between loans and deposits, ratio of loans to total assets, net interest income the total income, non-interest expenses to gross income, real GDP growth rate, the HHI index and EBRD. The null hypothesis was rejected because it was not shown that the independent variables affect the dependent variable.

The results of the research led to the conclusion that the profitability of banks in BH is primarily determined by specific bank performance, as well as the industry-specific and certain macroeconomic indicators. Specifically, it was shown that certain variables have an effect on the movement of ROAA. When the dependent and independent variables were taken into the calculation, a positive correlation was found between them, except in the case of the total assets of the banking sector, liquidity risk and non-interest expense to total revenue, because it is quite understandable that the increase in non-interest expenses, or the cost of provisions for general credit risks and potential credit implies reduced profitability. Also, in the relationship between loans and deposits, i.e. liquidity and profitability on average assets, a negative trend was recorded, which is quite justified because the banks with a higher amount of unused liquid assets generate less profitability.

The banking system in BH has kept stability so far despite the visual impact of certain shocks coming from the country and abroad. Systemic risk is still present and directly correlated with negative or slow growth in gross domestic product and an unsatisfactory level and pace of domestic demand. In terms of foreign observed variables, in addition to the concentration index and the index of banking sector reform, GDP growth is of capital importance for the future profitability of the banks so that the establishment and desire for appropriate macroeconomic policies can have a very positive impetus to further economic growth. A recovery of economic activity in BH and improvement of long-term loans placement will require faster implementation of structural reforms to attract foreign capital and recovery of domestic demand. Future research on this topic can be expanded depending on the availability of the database, so that the use of more appropriate explanatory variables for a longer period of time can provide a better analysis.

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