

Intellectual Capital Valuation and Stock Market Performance in an Era of Financial Turmoil: Blue Chip Banks Listed in Stock Exchanges of the Visegrad Countries

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SUMMARY

The core purpose of this empirical study is to investigate the influence of intellectual capital on stock market performance of the Visegrad countries in era of financial turmoil. This study is prompted by increasing evidence that the major drivers of value creation focus on a firm's intangible assets rather than its physical tangibles. In this quantitative analysis, nine listed large banks concentrated in particular national stock exchanges in Prague, Budapest, Warsaw and Bratislava are investigated. The study uses empirical data from Bloomberg Terminal Platform for data management that cover 2006-2012 and Intellectual Capital methods based on market capitalization.

Keywords: Banking sector, financial crisis, valuation, stock exchange, intellectual capital.

Journal of Economic Literature (JEL) code: G01, G10, G21, G32

INTRODUCTION

The financial crisis emerged in the summer 2007, and a year later, with the bankruptcy of the investment bank Lehman Brothers, in the present decade the apogee of panic was reached. It was an unprecedented event in the history of the postwar economy, and had huge implications for the global financial environment. The financial crisis showed the weakness of financial institutions in most developed countries. Fundamental credit condition problems in the region led to pressure on bank capitalization and profitability. Banks had to face real financing problem and roll up their own short-term debt. The examples of financial institutions embroiled in the process of mortgage securitization and securities trading with negative consequences started to cross the geographical borders of the United States. The rapid drop in the US housing market was the trigger for spreading the influence of the crisis to other areas where assets were held. It became obvious that the subprime crisis had transformed into a banking crises and started to steadily infect other assets, not only in developed western countries but in emerging markets as well. The scale of the crisis reached a global dimension, no matter what kind of liberal or conservative policy was dominating in particular markets.

Aalbers (2009) pointed that crisis started in 2007 when credit indicators on the US real estate market began

to creep up, accompanied by the fall of prices. The increasing interest rates bit by bit swept away the frontier of the solvency of households and over time they became massively insolvent. The subprime mortgage securities depreciated while more credit institutions went bankrupt or posted large losses. Large credit institutions of the United States such as Citigroup, Merrill Lynch, Goldman Sachs and Morgan Stanley suffered billions of dollars in losses by the end of 2007.

Then a dramatic turn occurred: in 2008 real estate prices in the US dropped by 20% and in some cities the fallen was up to 30%. According to Egedy (2012), another problem was that rating firms were closely intertwined with lending companies like banks, which led to the confusing situation that rating agencies often rated their own decisions. Financial speculation and panic due to deterioration of the situation also became factors in the outbreak of the global fiscal crisis. A similar point of view was presented by Akerlof and Schiller (2009), who pointed out that speculation on the financial markets was the main reason for the crisis. Bookstaber (2007) and Authers (2010) emphasized that problems caused by the crisis lie, on the one hand, in institutional structures and lack of control, and in the weaknesses of state institutions on the banking system and, on the other hand, in the wide-spread misconception that such long-established, large institutions do not go bankrupt.

THE INTELLECTUAL CAPITAL CONCEPT

There is increasing evidence that the major drivers of value creation in present decade focus on a firm's intangible assets rather than its physical tangibles. Over the last three decades the concept of intellectual capital has become popular among many researchers. Even today, after so many years of investigation, there is no universally accepted definition of Intellectual Capital (IC). For instance, Edvinsson and Sullivan (1996) define Intellectual Capital as knowledge that can be converted into value. From the perspective of Hunter et al. (2005), who categorize IC as a subset of Intangible Capital, the term intangible refers to assets that do not exist physically, and capital relates to assets retained by the organization to contribute to future profits. On the other hand Ross and Ross (1997) define IC as all the processes and the assets which are not normally shown on the balance sheet, as well as all the identifiable intangible assets which may be observed on balance sheets, like trademark, patents and brands.

It is often emphasized that the essence of intellectual capital is based on three pillars: human capital, organizational capital and relation capital with customers and business partners. False illusion lies in the belief that knowledge alone is sufficient to gain an advantage. Knowledge is just the source to achieve the possibility of transformation of potential included in the three pillars into real value for the company. Then we can assume that the formation of intellectual capital in that way becomes the most precious resource in the entire company's assets, making the possibility for the creation of a competitive advantage in the market.

In order to describe the role of IC, Edvinsson and Malone (1997) compared organizations to a tree, observing that both are living organisms with corresponding elements. Available financial documents are represented in the visible components of the tree like leaves and fruit. Assuming that this represents the true nature of the tree, or even of its future health, is misleading. In fact, the root system significantly determines the future health of the tree. According to Stewart (1991) IC is one part of a revolution. Within this radical era of transition to a knowledge economy, information replaces working capital, and intellectual assets replace physical ones. We are now in an era in which natural resources and physical labor have largely been replaced by knowledge and communication as the fundamental sources of wealth. Intellectual Capital is the most important value driver in companies. Additionally Nonaka and Takeuchi (1995), emphasize that a company cannot establish a sustainable competitive advantage without proper knowledge management.

THE CONCEPTUAL FRAMEWORK

The conceptual framework of the present study is to investigate the relationship between Intellectual Capital valuation and the stock market performance of large listed banks in the stock exchanges of the Visegrad countries during the global financial turmoil. Previous investigations and empirical results of studies exploring the connection of IC and stock market performance were inconclusive, as I will discuss later. The second aim of this study is to analyze how the global crisis has affected stock market performance and intellectual capital value. This research focuses only on large listed banks from Visegrad countries for various reasons: the banking sectors in these countries have undergone a major restructuring process in the transition from a centralized to a market economy system. Banking systems in these countries share high levels of foreign bank penetration due to strong economic and financial integration with the advanced European countries. Finally, during the crisis their banking systems became highly susceptible to deepening European debt and the banking crisis.

The basic ambition was to extend the actual empirical studies about IC and the stock exchange and focus particularly on some large banks from countries that are less penetrated and investigated. That is why my basic research question is whether the Intellectual Capital value change of listed banking blue chips from the Visegrad countries affects their stock market performance during global financial turmoil.

The first step in my research is to determine the appropriate indicators of IC valuation among all available that correspond to market capitalization and return on assets and then analyze the empirical results. The hypothesis was defined as follows:

H1: The Intellectual Capital value change of listed banking blue chips from Visegrad countries, affect their stock market performance during global financial turmoil.

For hypothesis-testing purpose I use methods that are based on market capitalization and return on assets. I decided to use the VAIC methodology (Pulic 2000), MVA methodology (Stewart 1990) and MV/BV ratio (Stewart 1997). All information for the application of these methodologies is available in the companies' accounts and public databases. This research uses quantitative analysis and is based on empirical data from Bloomberg Terminal Platform for data management that cover the period of time from 2006 to 2012.

The empirical analysis is undertaken for the four Visegrad banking sectors over the period 2006 to 2012 and involves nine listed blue chip banks: FHB Mortgage Bank Co Plc, OTP Bank, OTP Banka Slovensko, Všeobecná úverová banka, Komerční banka, Bank Handlowy S.A., Bre Bank S.A., Pekao S.A., and PKO BP S.A. A blue chip company refers to large and

creditworthy company, well established that has financial strength, stability and good history of dividend payments to investors. According to New York Stock Exchange Gropu Inc. (2011) blue chip stock is stock in company with national reputation for quality, reliability and the ability to operate profitably in good times and bad.

RESEARCH METHODOLOGY

Bearing in mind that research is focusing on companies listed on the stock exchange from the banking sector, the research methodology needed to consider the specification of bank's financial statements and data availability. There is no universally accepted IC measurement and evaluation method. Sveiby (2007) categorizes the methods into four groups: market capitalization methods, direct IC measurement methods, scorecard approaches and economic value added approaches. Based on the research of Sledzik, Czerwinska et al. (2010), there is a group of IC valuation methods selected by experts as the most applicable and best suited to the purpose of research. Among them the highest scores were assigned to the following methods: MVA (190), KCE (170), MV/BV (140), VAIC (130), CIV (105) and EVA (65).

Market Value to Book Value Ratio

The Market Value to Book Value ratio (MV/BV) was proposed by Stewart (1997) and is based on conception that intellectual capital is the difference between a company's market value and its book value (Guthrie, 2001). According to the suggestions of Urbanek (2008), construction of the ratio is as follows:

$$MV/BV = \frac{\text{price_of_shares} \times \text{number_of_shares}}{\text{assets} - \text{debt_capital}} \quad (1)$$

$$MV/BV = \frac{\text{market_value}}{\text{book_value}} \quad (2)$$

Market value is calculated by multiplication of the actual market price of the shares and the total number of shares, whereas book value is calculated by looking at the firm's historical cost according to the financial statement, in line with accounting rules. This method has been criticized because IC value is determined by accounting policy and the volatility of market price of equity in some circumstances may reflect the mood of investors and be the results of panic. However, the ease of calculation and data availability is making this method one of the most used tools to evaluate IC among others. Further, Ghosh and Wu (2007) identify the market-to-book value ratio (MV/BV) as a proxy measure for measuring the investor response.

Market Value Added

The MVA concept was presented by Stern Stewart & Co. in the beginning of the 1990s. It measures the difference between the market value of the firm and the amount of capital invested. According to Shil (2009) when total market value of a company is more than the amount of capital invested in it, the company has managed to create shareholder value. If the market value is less than capital invested, the company has destroyed shareholder value. The construction of the ratio is as follows:

$$\text{Market Value Added} = \text{Company's total Market Value} - \text{Capital Invested} \quad (3)$$

With the simplifying assumption that market and book value of debt are equal, this is the same as:

$$\text{Market Value Added} = \text{Market Value of equity} - \text{Book value of equity} \quad (4)$$

Further, Thenmozhi (2000) identifies market value added as being identical in meaning to the market-to-book ratio. The difference is only that MVA is an absolute measure and market-to-book ratio is a relative measure. According to Stewart (1994), market value added tells us how much value the company has added to, or subtracted from, its shareholders investment. Successful companies add their MVA and thus increase the value of capital invested in the company. Unsuccessful companies decrease the value of the capital originally invested in the company. The biggest disadvantage of this method is the simplification that intellectual capital value is just the difference between market and book value and in some cases could be negative.

Value Added of Intellectual Coefficient

According to its founder, this methodology shows the abilities of a company in value creation and represents a measure for business efficiency in a knowledge-based economy (Pulic, 1998). VAIC was designed to provide a means by which to measure the efficiency of three types of inputs: physical and financial capital, human capital, and structural capital (Pulic, 2000).

The model has been explored and explained by various approaches to the research application of the model in various stages of the literature. For example, Bontis (2001), made an extrapolation on the theory of reasoned action with additional variables leading to an action theory model of consumption. Additionally, Wang and Chang (2005) classify intellectual capital into four elements – human capital, customer capital, innovation capital and process capital – and relate these elements to

the performance of the firm. Further, Chen et al. (2004) found a significant relationship between the scores of the four IC elements and the business performance of firms, providing evidence of the validity and rationality of the VAIC model and the qualitative index system.

According to Sledzik, Czerwinska et al. (2010), the main advantage of the VAIC ratio is the simplicity of the calculation and the fact that all the necessary data are available in the financial statements of banks. In addition, the indicator allows a comparative analysis between companies operating in the same competitive sector and introduces basic standards for measuring the effectiveness of their activities. However, the VAIC ratio has been subjected to criticism. For example, Puntillo (2009) was unable to confirm the link between the variables involved. The only statistically significant correlation was found between CEE and business performance indicators. Further, Samiloglu (2006) found no significant relationship between the MV/BV coefficient and the VAIC model. The value added of intellectual coefficient can be written as follows (Pulic, 1998):

$$VAIC^{TM} = HCE + SCE + CEE \quad (5)$$

where VAIC = value added intellectual coefficient as an overall indicator of capital employed efficiency, HCE = indicator of human capital efficiency, SCE = indicator of structural capital efficiency and CEE = indicator of asset value efficiency.

The VAIC ratio is determined in five steps: (1) estimation of total value added VA, (2) determination of the human capital efficiency ratio HCE, (3) calculation of the efficiency ratio of structural capital SCE, (4) calculation of the capital employed efficiency ratio CEE, and finally (5) addition of the indicators listed in Steps 2, 3 and 4.

A company's value added VA is defined as a difference between sales outputs OUT, which represents sales, and inputs IN which includes all expenses except labor costs. The formula is as follows:

$$VA = OUT - IN \quad (6)$$

The next step is determining the human capital efficiency ratio HCE. It includes the company's value added and human capital HC, measured by yearly labor costs:

$$HCE = \frac{VA}{HC} \quad (7)$$

Later, we need to calculate the efficiency ratio of structural capital SCE, which includes structural capital SC and the company's value added. It can be written as follows:

$$SCE = \frac{SC}{VA} \quad (8)$$

where structural capital SC is defined as the difference between VA and HC.

The next to last step is calculation of the capital employed efficiency ratio CEE, which is the value added created by one unit of physical and financial capital of a company:

$$CEE = \frac{VA}{CE} \quad (9)$$

Last but not least, we add HCE, SCE and CEE in order to obtain the result of the VAIC ratio.

RESEARCH RESULTS

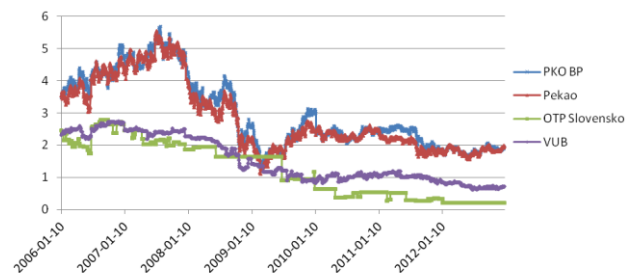
The conceptual framework of the present study was to investigate the relationship between IC value and the stock market performance of nine listed companies in the banking sector of the Visegrad countries between 2006 and 2012. Based on the research question, three major methodologies were selected as best suiting the purposes of the research: MV/BV ratio, Market Value Added, and Value Added of Intellectual Coefficient.

Methodology Results of Measuring Intellectual Capital by MV/BV Ratio

The Market Value to Book Value ratio, calculated by multiplication of the actual market price of the shares and total number of shares by the book value of shares, is one of the most commonly used methods by researchers to present the evidence of intellectual capital in the company. Values of the MV/BV ratio for the nine investigated banks over the period of 2006-2012 are shown in Table 1.

In terms of ratio MV/BV value was the highest for the whole group of investigated banks in 2006 and 2007, before the global financial crisis had reached its apogee in 2008. Among the best performing in 2006 were PKO BP (4.66), Pekao (4.26) and FHB Mortgage Bank (4.17).

The lowest values in the same year were recorded for Bank Handlowy (2.09), Komercni Banka (2.37) and OTP Banka Slovensko (2.65).



source: own calculations based on data from Bloomberg Terminal Platform

Figure 1. The best and worst performing banks by MV/BV ratio values in 2006-2012

Table 1
MV/BV values for investigated banks, 2006-2012

No.	Bank	Country	2006	2007	2008	2009	2010	2011	2012
1	FHB Mortgage Bank Co Plc	Hungary	4.17	3.81	1.11	1.09	1.06	0.57	0.50
2	OTP Bank	Hungary	2.92	2.76	0.77	1.29	1.08	0.64	0.79
3	OTP Banka Slovensko	Slovakia	2.65	1.86	1.64	1.17	0.53	0.32	0.20
4	Vseobecna Uverova Banka	Slovakia	2.71	2.27	1.57	0.84	1.06	0.87	0.72
5	Komerčni Banka A.S.	Czech Rep.	2.37	3.34	1.82	2.21	2.25	1.60	1.55
6	Bank Handlowy S.A.	Poland	2.09	2.33	1.11	1.47	1.88	1.38	1.74
7	BRE Bank S.A.	Poland	3.92	4.50	1.50	1.87	1.85	1.29	1.42
8	Pekao S.A.	Poland	4.26	4.05	2.07	2.32	2.33	1.74	1.97
9	PKO BP S.A.	Poland	4.66	4.41	2.54	2.32	2.54	1.76	1.94
	mean		3.31	3.26	1.57	1.62	1.62	1.13	1.20
	standard deviation		0.89	0.93	0.51	0.54	0.66	0.51	0.62

source: own calculations based on data from Bloomberg Terminal Platform

The panic on the stock exchange occurred in 2008 due to financial instability related to mortgage credit, the growth of uncertainty and the bankruptcy of Lehman Brothers Bank in the US. The average MV/BV ratio in 2008 decreased by 52% compared to 2007, from 3.26 to 1.57. However the high volatility on the market and stock price drop did not yet result in the worst value of the ratio; the lowest MV/BV ratio was recorded in 2011 (mean 1.13) and for some banks one year later. Among the banks in 2011 with the weakest results over the whole period were OTP Bank (0.64), BRE Bank (1.29), Pekao (1.74) and PKO BP (1.76). In 2012 the weakest results over the period 2006-2012 were experienced by OTP Banka Slovensko (0.20), FHB Mortgage Bank (0.50), Vseobecna Uverova Banka (0.72) and Komerčni Banka (1.55). There is only one example of a bank which recorded its lowest MV/BV ratio in 2008 compared to other years (Handlowy Bank, at 1.11).

After the peak of the financial crisis for all investigated banks, the value of MB/BV ratio was no higher than at the beginning of the research period in 2006-2007. Furthermore, the mean value of MV/BV ratio

at the end of 2012 was lower by 64% than in 2006 and 63% lower than in 2007.

On examining the relationship between MV/BV ratio and share price it is found that all banks except for Komerčni Banks ($r = 0.3922$) showed a high correlation with the average being $r = 0.7239$. Among banks with high correlation were: OTP Bank ($r = 0.8391$), Vseobecna Uverova Banka ($r = 0.8390$), OTP Banka Slovensko ($r = 0.8333$), Pekao ($r = 0.7918$), FHB Mortgage Bank ($r = 0.7878$), Bank Handlowy ($r = 0.7557$), PKO BP ($r = 0.6712$) and BRE Bank ($r = 0.6045$).

Methodology Results of Measuring Intellectual Capital by MVA Ratio

Market Value Added is essentially the difference between the company's current market value, as determined by its stock price, and its economic book value. The MVA of selected banks shows that at the end of 2006 and 2007 all investigated banks had positive MVA, as given in Table 2.

Table 2
MVA values of selected banks in million EUR, 2006-2012

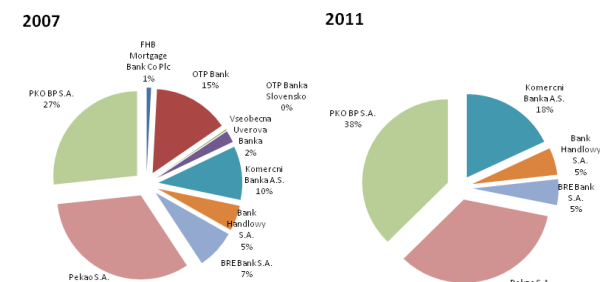
	2006	2007	2008	2009	2010	2011	2012
FHB Mortgage Bank	430.74	362.09	40.11	73.27	172.41	-3.90	-87.49
OTP Bank	6 662.85	6 314.11	-880.84	1 268.07	368.04	-1 624.35	-1 005.19
OTP Banka Slovensko	142.00	90.00	67.00	15.00	-41.00	-60.00	-91.00
Vseobecna Uverova	1 073.00	992.00	350.00	-156.00	59.00	-147.00	-320.00
Komerčni Banka	2 474.97	4 461.15	2 104.99	3 334.42	3 672.82	1 850.93	2 389.07
Bank Handlowy S.A.	1 543.73	2 116.00	155.78	717.96	1 444.00	543.63	1 438.16
BRE Bank S.A.	1 920.09	3 268.82	467.58	877.04	1 484.11	516.76	1 120.88
Pekao S.A.	7 551.34	14 093.74	4 123.80	5 878.87	6 758.07	3 532.01	5 306.25
PKO BP S.A.	9 623.12	11 525.16	5 196.17	6 595.12	8 282.04	3 879.50	5 476.53
mean	3 491.32	4 802.56	1 291.62	2 067.08	2 466.61	943.06	1 580.80

source: own calculations based on data from Bloomberg Terminal Platform

The intellectual capital represented by MVA ratio was the highest in 2007, with the average value of 4.8 billion EUR. Pekao S.A., PKO BP and OTP Bank were the top three companies by MVA value, with more than 30bln of EUR. An year later the average value of MVA decreased

by 73%, from 4.8 to 1.3 billion EUR. Each year in the period of 2008 and 2010 only one bank showed negative MVA each year, consecutively OTP Bank, Vseobecna Uverova Banka and OTP Banka Slovensko.

During the year 2011 and 2012 four banks – FHB Mortgage Bank, OTP Bank, OTP Banka Slovensko and Vseobecna Uverova Banka – had negative MVA and depreciated its shareholder value. The lowest average value of MVA was recorded at the end of 2011, with the value of 943 million EUR, decreased by 80%, compared to 4.8 billion in 2007. There were five banks – Komercni Banka, Bank Handlowy, BRE Bank, Pekao and PKO BP – that experienced positive MVA value each year over the period 2006-2012. The biggest contributions to the total value of MVA were made by PKO BP, Pekao, Komercni Banka, BRE Bank, Bank Handlowy, as shown in Figure 2.



source: own calculations based on data from Bloomberg Terminal Platform

Figure 2. Percentage share of MVA values for investigated banks in 2007 and 2011

In 2007 all investigated banks participated in the creation of total MVA value, with the shares holding adequately by Pekao S.A. (33%), PKO BP (27%), OTP Bank (15%), Komercni Banka (10%), BRE Bank (7%), Bank Handlowy (5%) and the rest with less than 4%. The

top three banks – Pekao S.A., PKO BP and OTP Bank – aggregated three quarters of the total MVA value in 2007, while in 2011 the top three held around 90% (PKO BP, Pekao S.A. and Komercni Banka).

The total MVA value between 2011 and 2007 decreased by 34.7 billion EUR, from 43.2 to 8.5 billion EUR. The biggest slumps were experienced by OTP Banka Slovensko (-167%), OTP Bank (-126%), Vseobecna Uverova Banka (-115%) and FHB Mortgage Bank (-101%). In contrast, the other banks kept a positive MVA value in 2011, despite decreases in MVA value: Komercni Banka (-58%), PKO BP (-66%), Bank Handlowy (-74%), Pekao (-75%), and BRE Bank (-84%).

On examining the relationship between MVA and share price of company it was found that share price is highly correlated to MVA, ranging from 0.6465 to 0.8491. For the investigated banks, the correlations were as follows: FHB Mortgage Bank (0.7987), OTP Bank (0.8415), OTP Banka Slovensko (0.8386), Vseobecna Uverova Banka (0.8491), Komercni Banka (0.6465), Bank Handlowy (0.8323), BRE Bank (0.7869), Pekao (0.7098), and PKO BP (0.8359).

Methodology Results of Measuring Intellectual Capital by VAIC Ratio

The biggest advantage of this method is that data for calculation can be found in financial statements. In general, the larger the size of VAIC ratio for the selected bank, the better efficiency in the use of capital employed, human capital, structural capital and better value added size. The results of VAIC ratio for the investigated banks in 2006-2012 are presented below.

Table 3
The Value Added of Intellectual Coefficient (VAIC) ratio for investigated banks in 2006-2012

No.	Bank	Country	2006	2007	2008	2009	2010	2011	2012*
1	FHB Mortgage Bank Co Plc	Hungary	4.09	3.72	7.08	7.80	12.01	9.51	5.22
2	OTP Bank	Hungary	4.45	4.08	3.79	3.29	3.14	2.96	-
3	OTP Banka Slovensko	Slovakia	2.56	2.64	2.85	1.94	1.58	2.08	1.64
4	Vseobecna Uverova Banka	Slovakia	4.13	4.37	4.42	3.80	4.10	4.28	-
5	Komercni Banka A.S.	Czech Rep.	4.87	5.21	4.95	4.35	4.66	3.61	4.45
6	Bank Handlowy S.A.	Poland	3.75	3.59	3.05	2.89	3.37	3.29	3.73
7	BRE Bank S.A.	Poland	3.53	3.74	3.95	2.28	3.35	4.11	4.07
8	Pekao S.A.	Poland	4.08	4.05	4.41	3.79	6.17	6.41	6.53
9	PKO BP S.A.	Poland	3.44	3.90	3.95	3.35	3.92	4.24	4.04
mean			3.88	3.92	4.27	3.72	4.70	4.50	4.24

source: own calculations

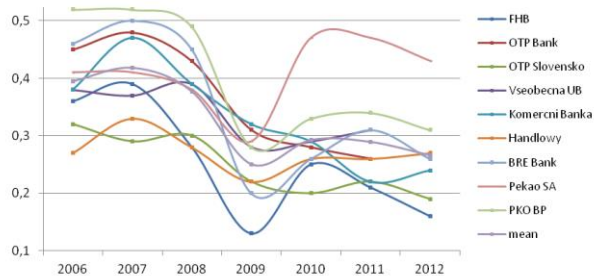
* For 2012 two banks had not reported their audited annual reports by the point when data was gathered.

On examining the relationship between VAIC ratio and the share price of company it was found that share price is moderately correlated to the value of VAIC ratio, in a range from -0.4307 to 0.6653. Correlations for the investigated banks are as follows: FHB Mortgage Bank (-0.4307), OTP Bank (0.6473), OTP Banka Slovensko (0.6653), Vseobecna Uverova Banka (0.3704), Komercni

Banka (0.1376), Bank Handlowy (0.6594), BRE Bank (0.1327), Pekao (-0.3153), and PKO BP (-0.3067).

The leaders in terms of the efficient use of capital invested in the bank in 2006 include the PKO BP (CEE = 0.52), OTP Bank (CEE = 0.45) and BRE Bank (CEE = 0.46). The lowest values of CEE in the same year were recorded for Bank Handlowy (CEE = 0.27), OTP Banka

Slovensko (CEE = 0.32) and FHB Mortgage Bank (CEE = 0.36). The efficient use of capital invested for the period of research is shown in Figure 3.



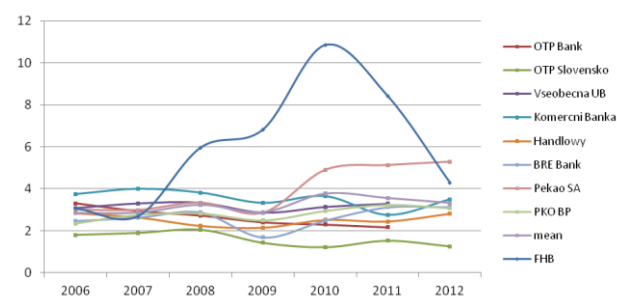
source: own calculations

Figure 3. Capital Employed Efficiency (CEE) ratio for investigated banks, 2006-2012

All tested banks recorded a decrease in the efficient use of capital invested from the peak of 2006-2007 to the bottom, in 2009. Some of the investigated banks have even continued the negative trend to the end of 2012, such as Komercni Banka and OTP Banka Slovensko, and OTP Bank to the end of 2011. The banks recording the biggest slump were FHB Mortgage Bank (-64%), BRE Bank (-56%), PKO BP (-46%), and Pekao SA (-29%) over the period 2006-2009. The major reason was due to the growth of capital employed over the value added between 2006 and 2009. The average value and median value of CEE over the period 2006-2012 amounted to 0.33 and 0.2, respectively.

The highest efficiency of human capital in 2006 was shown by Komercni Banka (HCE = 3.75), OTP Bank (HCE = 3.30) and Vseobecna Uverova (HCE = 3.08). The lowest HCE ratios in the same year were recorded by OTP Banka Slovensko (HCE = 1.80), PKO BP (HCE = 2.34) and BRE Bank (HCE = 2.47).

The values of the structural capital efficiency (SCE) ratio of the investigated banks in the period 2006-2012 are presented in Figure 4.



source: own calculations

Figure 4. Structural capital efficiency (SCE) ratio of investigated banks, 2006-2012

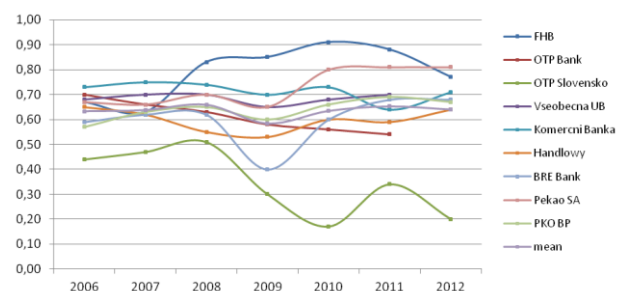
Regarding the HCE ratio, values have been stable and smooth for the majority of banks over the period 2006-2012 because of low volatile human capital values. The

case of FHB Mortgage Bank is an exception, mainly due to a rapid decline of 58% in human capital between 2007 and 2008, but it began to rise again from 2011. The least volatile HCE ratio among banks were Vseobecna Uverova, with a coefficient of variation of 0.052, and Handlowy (CV = 0.098). The most volatile HCE ratios were found for FHB Mortgage Bank (CV = 0.455) and Pekao (CV = 0.264).

The highest efficiency of human capital in 2012 was found for Pekao SA (HCE = 5.29), FHB Mortgage Bank (HCE = 4.29) and Komercni Banka (HCE = 3.50). Most of the investigated banks improved their HCE ratio in 2012 compared to 2006.

A deterioration of HCE ratio was observed for OTP Bank of (-34%), OTP Slovensko (-30%), Komercni Banka (-7%) and Handlowy (below 1%). The mean value of the HCE ratio was the highest for all banks in last three years, between 2010-2012, and was HCE = 3.77, HCE = 3.56 and HCE = 3.33, respectively. Even if we exclude FHB Mortgage Bank, the mean value in the period between 2010 and 2012 will be the highest. The lowest value of average human capital efficiency ratio, HCE = 2.39, occurred in 2009.

The values of the structural capital efficiency (SCE) ratio of banks in the period 2006-2012 are presented in Figure 5.



source: own calculations

Figure 5. Structural capital efficiency (SCE) ratio of investigated banks, 2006-2012

The highest SCE ratios in 2006 were noted for Komercni Banka (SCE = 0.73) and OTP Bank (SCE = 0.70). The lowest value of SCE was recorded in 2009 for OTP Slovensko (SCE = 0.30), BRE Bank (SCE = 0.40) and Handlowy (SCE = 0.53). The lowest average structural capital efficiency ratio, amounting to SCE = 0.35 over the period 2006-2012, was noted for OTP Slovensko due to its weak relation between value added and human capital value. In contrast, the highest average SCE ratios were recorded by FHB Mortgage Bank (SCE = 0.79) and Pekao SA (SCE = 0.73).

Most of the investigated banks noted a decrease in the SCE ratio between 2008 and 2009, except FHB Mortgage Bank, which reported a moderate growth of 2.41% year to year. On the other hand, BRE Bank and OTP Banka Slovensko noted the biggest drops in SCE ratio in 2009 compared to 2008, 35.48% and 41.18%, respectively.

CONCLUSIONS

This paper presents an investigation of the relationship between intellectual capital value and the stock market performance of nine companies listed on the stock exchange from the banking sector of the Visegrad countries between 2006 and 2012.

The methodology used in this study includes MV/BV ratio, MVA ratio and VAIC ratio for calculating IC. It was found that the relationship between the MV/BV ratio and share price is positively correlated between $r = 0.3922$ and $r = 0.8391$. All banks except for Komerčni Banks ($r = 0.3922$) showed a high correlation with the average being $r = 0.7239$. The average MV/BV ratio in 2008 decreased by 52% compared to 2007, from 3.26 to 1.57. However the high volatility on the market and stock price drop did not yet result in the worst value of the ratio; the lowest MV/BV ratio was recorded in 2011 (mean 1.13) and for some banks one year later.

The intellectual capital represented by MVA ratio was the highest in 2007, with the average value of 4.8 billion EUR while an year later the average value of MVA decreased by 73%, from 4.8 to 1.3 billion EUR. Each year in the period of 2008 and 2010 only one bank showed negative MVA each year, consecutively OTP Bank, Vseobecna Uverova Banka and OTP Banka Slovensko.

Furthermore, the relationship between MVA and the share price of listed banks is even higher, correlated in a

range from 0.6465 to 0.8491. In contrast, when testing the relationship between VAIC ratio and the share price of the bank, it was found that the share price is correlated to the value of VAIC ratio, ranging from -0.4307 to 0.6653. Those methods which correspond with market capitalization, like the MV/BV ratio and MVA, have shown a higher correlation in relation with intellectual capital value than the VAIC methodology. Negative correlations was investigated only for three banks as follows: FHB Mortgage Bank (-0.4307), Pekao (-0.3153), and PKO BP (-0.3067). All tested banks recorded a decrease in the efficient use of capital invested from the peak of 2006-2007 to the bottom, in 2009. Some of the investigated banks have even continued the negative trend to the end of 2012, such as Komerčni Banka and OTP Banka Slovensko, and OTP Bank to the end of 2011. Regarding the human capital efficiency, values have been stable and smooth for the majority of banks over the period 2006-2012 because of low volatile human capital values. The case of FHB Mortgage Bank is an exception, mainly due to a rapid decline of 58% in human capital between 2007 and 2008, but it began to rise again from 2011. Most of the investigated banks noted a decrease in the structural capital efficiency between 2008 and 2009, except FHB Mortgage Bank, which reported a moderate growth of 2.41% year to year.

Nowadays, it is becoming clear that intellectual capital is a key hidden asset value of a company and represents the ability to obtain a competitive advantage.

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