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**DYNAMICS OF THE CAPITAL BASE AND FUNDING STRUCTURE OF
BANKS AROUND THE GLOBAL FINANCIAL CRISIS**

Evidence from the US and European banks.

Master's Thesis in
Accounting and Finance

VAASA 2014

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Topic of the thesis:

Dynamics of the capital base and funding structure of banks around the global financial crisis. Evidence from the US and European banks.

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Major Subject:

Finance

Year of Entering the University:

2012

Year of Completing the Thesis:

2014

Pages: 98

ABSTRACT

This thesis investigates the dynamics of bank capital base and funding structure before, during and after the latest financial crisis. The data used in this study contains banks from the US, UK and 26 European countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Switzerland. The whole sample includes 6927 individual banks from these countries. Sample period captures the years from 2004 to 2012 and is divided into three sub periods: pre crisis, crisis and post crisis. The first period contains years 2004-2006, the second 2007-2009 and the third 2010-2012. Fixed effects panel estimation with OLS estimator for variable coefficients is employed in order to execute empirical tests.

According to the empirical findings banks tend to increase their capital under good economic conditions. Raising capital is not costly during economic expansion as suggested by theories and previous empirical research. On the other hand during crises and post crisis periods raising capital becomes costly process. Therefore, the coefficient of GDP growth becomes negative in post crisis time. Other findings suggest that bank size, short-term funding and interest rates have a negative impact on the capital ratio in all times. Net income and non-interest income have a positive impact on the capital ratio. Loan loss reserves also have a positive impact on the capital ratio; however it is significant only under good economic conditions, i.e. during the first sub period. The findings suggest that long-term funding has been affected by the crisis more. Because of rising uncertainty banks were unable to receive much long-term funding. The results show that Scandinavian countries suffered less from the crisis. These countries were able to maintain sufficient capital ratio during the crisis. Main limitations of this study are the studied geographical area and applied methodology. More advanced method such as GMM estimation can be applied in further studies.

KEYWORDS: Capital & funding structure, Banks, Financial crisis

1. INTRODUCTION

The recent global financial crisis raised many questions about banks' performance, corporate governance, risk taking and their preparedness to such crises and recessions. Most of the economists agree that this was the worst crisis after Great Depression of 1929-1933. Furthermore, there were rising blames to banks by public, who thought that banks were responsible for this crisis. The issue was discussed widely by economists and politicians, and most of the opinions were agreeing at one point that banks must "pay the bill" for the crisis. International Monetary Fund proposed to introduce two new taxes for banks of G-20 countries. The proposal was discussed widely but was not accepted by most of the governments of G-20 countries. Only the European Union suggested that they could take into account the proposal separately. However, the decision about new taxes has not been made so far. (Goedde-Menke, Langer, Pfingsten 2013, Brunnermeier 2009)

Along with these discussions, the compensations payable to CEOs of banks during and after the crisis were also debated widely. Many scholars, governments and general public argued that it is unacceptable to pay high bonuses for CEOs under these harsh economic conditions. Moreover, they argued that it is unethical to pay high bonuses and that the bonuses should be spent to help overcome the crisis. Recently, the European Union agreed to cut the executives' compensations by applying new legislation. However, countries with liberal economies like US and UK do not seem willing to apply this legislation because they do not want to intervene to free economic choices of the banks. Generally, all the arguments in this topic support the idea that, current compensation payment systems motivate executives to focus more on the performance in the short-term rather than long-term. This, in turn caused the "bubble" in issued loans in order to get more compensation. This issue is also related to the risk taking of the banks. Hence high compensation promises causes more risky decisions, and therefore banks become more vulnerable to economic conditions. (Raviv and Sisman 2013, Dong 2013)

All these developments and discussions about banks extremely raised the interest in this topic in recent years. How banks behaved before and during crisis? How they act after the crisis? Did they learn from the crisis? These are the questions now to be answered in order to get the picture of the current trends of banks behaviors.

1.1. Generic background

As discussed in introduction bonuses for better performance were the main source of income for “front desk” bank employees in US before the subprime mortgage crisis occurred. Majority of loan officers were motivated to issue as much loan as they can, because their income depended on their loan portfolio. This attitude forced them to issue loans even for subprime customers. Subprime customers are the customers with bad credit history, who had some difficulties in paying back their loans in the past. Not only the incentives by loan officers but also the stimulus by the managers to create large loan portfolios had increased the number of issued subprime lending. Subprime lending mainly focused on mortgages and created much risk for banks because of the amount of loans issued. However, the process was not limited only with subprime lending. Thus banks were trading asset backed securities with high risk which were related with subprime customers, and external investors were not well informed about these customers. They mainly relied on the information obtained from banks themselves and rating agencies. However, further development of subprime crisis revealed the fact that this information was not enough to measure the risk for the external investors. While the amount of risky loans increased in early 2000s, banks and investors were taking high risks on their shoulders. (Dong 2013, Kenc and Dibooglu 2010, Jagannathan, Kapoor, Schaumburg 2013, Dwyer and Lothian 2012)

When majority of customers were unable to pay back their loans, the disturbances in the US financial market started. This was also stimulated by falling housing prices in the US. Customers realized that the value of their real estate is lower than they are obliged to pay to banks. Therefore, they were less willing to pay back loans. Mainly the incentives of subprime customers caused the increase in the amount of bad lending. This in turn decreased the value of issued securities backed by mortgages. The process employed such a number of financial institutions that, it turned to a nationwide crisis in US. (Jagannathan et al. 2013)

The initial signs of the subprime crisis turning to global one were observed when two major banks Northern Rock and IKB Deutsche Industriebank have collapsed. Thereafter major world economies USA, Switzerland, Canada and European Union announced about their bailout policies in 2007. (Lin & Treichel 2012:12) Thus, subprime mortgage crisis in US spread to the world as global financial crisis after 2007.

The financial crisis spread around the world, as major financial institutions have collapsed and were taken over by the governments. The collapse of Lehman Brothers, one of the largest US investment banking companies, led to some chain reaction

processes. This was the worst bankruptcy record in US history for the amount it covered. Furthermore, the collapse of other major banks, investment and insurance companies were resulted by their high risk taking attitudes as they were investing in risky mortgage backed securities. (Lin & Treichel 2012)

All these developments lead to judge the effectiveness of regulation in financial sector, mainly in banking sector. As a result new, stricter regulations came out, and Basel III regulation was implemented. Basel III intends to fortify banks' capital requirements and capital adequacy ratios in order to secure them in case of any future crises. In general, Basel III intends to strengthen banks' ability to overcome crises by increasing capital requirements and liquidity.

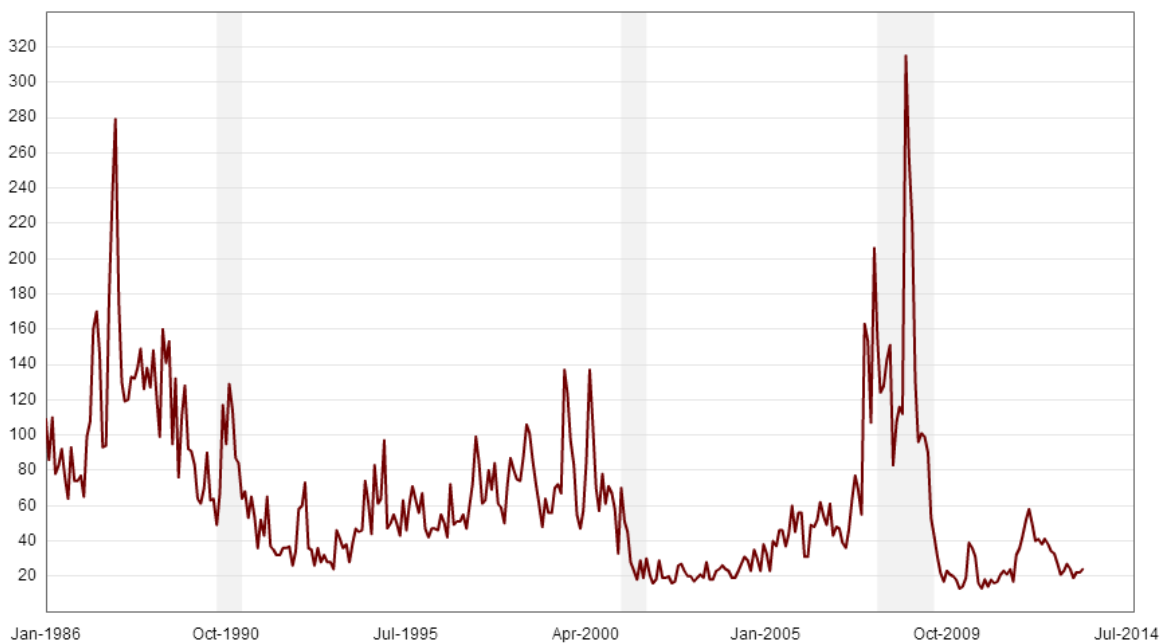


Figure 1. Changes in TED Spread between January 1986-June 2013. (Source: Macrotrends)

According to Basel Committee on Banking Supervision, Basel III aims to introduce new measures to improve regulation, risk management and control in banking sector. The measures aim the followings:

- Improve banks' capacity to overcome shocks evolving from economic and financial instabilities,

- Improve risk management and supervision
- Improve limpidity and release of information

Furthermore, BCBS claims that the purpose of these improvements in measures is first, to focus attention on bank-level regulation which will increase elasticity of banks to economic shocks. Secondly, it aims to cover systematic macroeconomic risks around financial institutions. (BCBS 2011)

All these improvements in bank regulation and bailout and financial policies of governments led the crisis to slow down and reduced its effects gradually. As a response to these policies TED spread, proxy for financial instability, decreased significantly in recent years. Measured as the difference between LIBOR and short-term US treasury bills rate, TED spread is a good proxy for financial crises. As the difference between these rates increases the riskiness of interbank lending also increases, while government bonds appear to be less risky. (Cretien 2005) Figure 1 shows the movement of TED Spread from 1986 to 2013.

As it can be observed from the graph, TED Spread increased dramatically during crisis time which indicates high riskiness of financial assets. According to the graph the years between 2007 and 2009 were the worst years of the crisis. TED Spread turned to normal after the end of 2009. This might indicate that uncertainty in financial markets has reduced. However the world economy is still suffering from the aftermath of the worst crisis of the last 70 years. Therefore, the research on the recent financial crisis is still important and interesting for many scholars.

1.2. Purpose of the study, intended contributions and limitations

The motivation arising from abovementioned reasons leads to set the main purpose of this study as to investigate whether and how the recent global financial crisis affected capital base and funding structure of banks. Banks all around the world were lacking financing at the times of crisis; therefore it is expected that their debt structures have changed after the crisis. Intuitively, the crisis is supposed to affect the capital and funding structure of banks. Since the regulations also changed and strengthened, they have also affected the capital structure of banks significantly. Also the financing for most of the banks became more difficult during the crisis, therefore the thesis also intends to investigate if short-term financing have prevailed the long-term financing

after the crisis. The crisis changed the future economic prospects and policies of banks. As a result it is expected that banks are more interested to issue short term loans and also investors are interested in making money in a significantly short period by investing in less risky short-term debts after crisis. Moreover, this thesis tries to find which countries are affected from the crisis initially and which are affected in later stages of the crisis. Obviously the United States is the first country to be affected from the crisis. It is expected that the countries with highest integration with US were affected by the crisis first. These are supposed to be the countries of Western Europe, especially, UK, France and Germany. It is interesting to know which countries are affected first in order to estimate the expected results of future crises.

Scandinavian countries have experienced banking crisis in near past in the years of 1988-1993. The crisis was not very severe for Denmark, and the country managed to overcome it until 1990. However, it lasted until 1993 for Norway, Sweden and Finland. Similar to the recent financial crisis, the crises in these countries occurred because of the high amounts of bank lending during economic growth. This economic growth and high credit and asset price growth were followed by economic recession, which lead to high loan losses. As a result many banks experienced lack of financing and governments of these countries intervened to bailout banking system. (Sandal 2004) Three most important reasons of the Nordic banking crises according to Sandal (2004) are

- Strong credit and asset price boom
- Weak risk management
- Inadequate supervision and macroeconomic policies

These causes of the Nordic banking crisis are very similar to the causes of the recent financial crisis. Therefore, it is important to investigate whether these countries were wise enough during last global financial crisis, and if they suffered less than other countries. It is expected that the recent crisis had shocked these countries in its later stages and they were able to recover more quickly compared to other countries.

Intended contributions. A study in the dynamics of bank capital and funding structure around crisis has not been carried out for a wider sample recently. This thesis is mainly contributing to the existing literature by investigating the patterns of capital and funding structure of 29 EU/EFTA countries and the US banks around latest financial crisis. The second intended contribution of this thesis is to find the differences between the capital structure of the banks of Scandinavian countries, particularly Denmark, Norway, Sweden and Finland, and other sample countries (excluding the US). If sufficient evidence is found to prove less riskiness of Scandinavian banks in terms of capital

buffers, general conclusions and further suggestions to apply Scandinavian banking practices in other countries can be made. Finally, the last intended contribution of the thesis is to find evidence for the speed of spread of the crisis among sample countries.

Limitations of the study. Major limitation of the thesis is the applied methodology. The fixed effects panel estimation applied in the thesis does not allow to control for country specific, bank specific and other factors because dummy variables are not applicable for this estimation method. Another limitation of the thesis is the geographical area of sample countries. Since the sample includes countries only from Europe and the US general conclusions for all banks of the world cannot be made with the findings of this thesis. It is important to extend sample and include at least significant countries from each continents to draw general conclusions for the dynamics of bank capital structure around crises. For more accurate empirical results advanced empirical methods such as GMM estimation can be applied.

1.3. Structure of the study

This thesis consists of seven chapters which investigate and explain mainly topics about latest dynamics of bank capital and funding structure in a consecutive order. The first chapter explains the main purposes of this study, summarizes previous research on the bank capital structure, profitability and risk taking attitudes, and introduces the hypotheses to be verified through empirical tests. The second chapter explains capital structure theories, particularly Modigliani and Miller theory, Trade-off and Pecking order theory of capital structure, and analyzes them from bank perspective. The third chapter focuses on the bank capital and funding structure issues. It clarifies the importance of the equity capital for safe and sound bank activities and explains funding structure of banks. Moreover, it describes the regulations in banking industry and explains the evolution of Basel Accord on Bank Regulation. Finally, the third chapter identifies different bank regulation practices in various countries. The fourth chapter presents general background about latest financial crisis, the situation before it and its main reasons. The chapter also identifies how crisis can spread among countries through different integration channels. The fifth chapter gives the description of the data used for empirical testing and methodology applied. The next chapter reports the results of empirical tests. Finally, the last chapter summarizes the study, the results of empirical tests and makes conclusions and suggestions for further research.

1.4. Literature review

Banks as financial intermediaries and leading financers of economy are always under the focus of various scholars, economists and politicians. Therefore, large amount of research is done in different aspects of banks' activities. Thus, the topic has never lost its importance and the recent global financial crisis has increased its prominence. The purpose of this chapter is to explain previous main studies on the bank capital structure, profitability and risk taking attitudes. It refers to main previous studies in order to draw a general image of bank capital structure and build a ground for further explanations. These studies vary from more fundamental ones to very recent research on the banks' capital structure during latest financial crisis.

1.3.1. Studies on profitability and risk taking attitudes

Previous research to study banks' behavior were done in order to examine specifically bank risk taking attitudes, bank profitability dynamics before and at the years of crisis, CEO compensations, and corporate governance issues prior to and during the crisis. In their paper "Risk-taking behavior and management ownership in depository institutions" Chen, Steiner and Whyte (1998) investigate the relationship between managerial ownership and banks' risk taking attitude. Their main findings show that as the proportion of the shares owned by the bank managers increase their risk taking attitude decrease. This finding has a practical interpretation in order to explain how managers with different remuneration options have acted in order to avoid much risk. This might explain why various banks have performed differently during recent financial crisis. Intuitively, it can be concluded that banks with high proportion of managerial ownership took less risks compared to those with low managerial ownership. Managers who hold the shares of their banks more worried about the risk taking because high proportion of their income comes from the shares.

A study by Hannan and Prager (2009) shows that sometimes some banks might affect profitability of other banks. Hence, they find out that existence of large banks along with rural community banks affect those small banks' profitability significantly. The study also shows that large out-of-market banks decrease positive effect of concentration for small community banks. Although the authors explain their findings to be useful for merger and acquisition decisions it can also be concluded that large banks drive the whole market and small community banks can be affected severely in case of failure of large banks.

Fortin, Goldberg and Roth (2010) investigate the risk taking attitudes of the bank managers in the period preceding the recent financial crisis. They investigate how ownership, managerial compensation and risk governance affect risk taking attitudes after the crisis. Their results show that CEOs with more control and CEOs who earn more in base salary than in bonuses are likely to take less risks. In contrast, CEOs and managers whose salaries are mostly based on bonuses are willing to take more risks. They suggest that decision making should be delivered mainly to managers, which in turn will reduce risk taking attitudes. (Fortin et al. 2010:911)

Hakenes and Schnabel (2011) investigate the impact of Basel II framework on small and large banks' risk taking attitude and find out that the framework provides different opportunities for those banks. Due to high costs of implementations only large banks can apply internal ratings based (IRB) approach for capital requirements whereas small banks can only afford to use standardized approach. They argue that adopting IRB lets large banks to benefit from relatively lower capital requirements and offer low cost bank services compared to small banks. Therefore, small banks take more risks than large ones under Basel II accords.

Dietrich and Wanzenried (2011) investigate the determinants of bank profitability in Switzerland before and during financial crisis. They find out that the crisis had impact on banks' profitability in Switzerland. They conclude that the main factors that explain bank's profitability are operational efficiency, the growth of total loans, funding costs and the business model. The banks which are more efficient than others are more profitable. "An above average loan volume growth affects bank profitability positively; higher funding costs result in a lower profitability." (Dietrich and Wanzenried, 2011:324) Furthermore, they state that banks which are more dependent on interest incomes are less profitable than others.

On the study of bank profitability during economic downturns Bolt, de Haan, Hoerberichts, Oordt and Swank (2012) try to explain driving factors of bank profitability. They find out that, banks' profitability is affected not only by the current condition of an economy but also their previous lending history. Hence, long-term interest rates before economic downturns affect profitability, measured by net interest income, during crises. Moreover, they find out that loan loss provisions are major moving factor of banks' profitability in all phases of economic cycles. Finally, their findings show that 1% decrease in real GDP growth leads to 15% decrease in return on assets.

In their study for the impact of good governance in banks on their performance Peni and Vähämaa (2012) find out that basically banks with good corporate governance performed better during the crisis. Although, their results are different and do not show a specific pattern in sake of good governance, general conclusion can be made that good governance caused significantly higher returns during the financial crisis.

Beltratti and Stulz (2012) examined the reason why some banks perform better during the financial crisis. They state that banks from the countries with more strict regulations performed better because they only focused their loans on specific areas. Therefore, they were not affected by the industries that crisis shocked more. Moreover, their results show that banks with short-term funding are affected more from the crisis. And banks with less leverage ratios performed better during the crisis. Furthermore, their results contradict to the view that poor governance caused the recent financial crisis. In contrast to the results of Peni and Vähämaa (2010) they find out that, banks with good governance, which they call banks with share-friendly boards, performed worse than others.

A study by Anginer, Demircuc-Kunt and Zhu (2013) on how deposit insurance affects bank risk during crises is interesting in terms of regulatory power of deposit insurance. Their findings show that deposit insurance increases banks' risk taking attitude in general. On the other hand it decreases risk during crises by assuring the minimum amount to be covered. Moreover, the findings show that countries with deposit insurance have lower systemic risk compared to the ones without the insurance. Despite this double characteristic of deposit insurance the authors conclude that it has a negative impact on bank risk. These findings is consistent with the findings of Forssbæck (2011) where he finds weak interdependence between deposit insurance and bank risk, because he assumes a partial deposit insurance in the model. However, the author suggests that the evidence could be stronger if implicit insurance have been applied.

1.3.2. Studies on bank capital structure

Tremendous amount of research were done for investigating the capital structure of firms and also specifically banks. Banks' capital structure differs from traditional firms' capital structure because of their nature. They are financial institutions and they must have certain minimum amount of capital according to legislations. This characteristic of banks sets them aside from other traditional firms.

More fundamental study by Marcus (1983) is focused on the capital decision of banks. The author states that the capital ratios of US banks have fallen dramatically in between the years of 1961 and 1978 and explains this tendency by empirical tests. The author suggests that this dramatic fall is the result of rising interest rates. Therefore, it can be concluded that during economic growth the interest rates are also tend to grow, which leads to the reduction in capital ratios. The author suggests that regulators should be aware of this tendency and make adjustments to deposit regulations. The study suggests the regulators have to be more sensitive to changing economic conditions in order to affect capital ratios effectively.

Another interesting research on bank capital topic by Berger, Herring and Szegö (1995) suggests that regulation in banking sector has decreased banks' capital ratios through many years, and these ratios became the lowest compared to other non-financial institutions. Berger et al. (1995) discuss the problems related to the regulatory capital requirements, where they state that it is hard to define regulatory capital, therefore sometimes regulations are unable to cover all of it and be absolutely efficient. Inaccurate capital requirements may increase the prices of bank services and cause opposite effect by decreasing the efficiency of banks. This article is important in order to understand how the regulations in banking sector might affect banks in different ways.

Froot and Stein (1998) investigate the relationship among risk management, capital budgeting and capital structure in banks. Their study relies on the approach which assumes that banks with the priority to maximize their values are more concerned about risk management and not all the risks that they are concerned about can be overcome by hedging operations. From the point of view of capital budgeting and capital structure choice their findings suggest that in short run raising new capital from external sources is costly. Holding a buffer stock of equity capital is also expensive for banks, even if this buffer is financed by retained earnings.

By taking into account these assumptions Froot and Stein (1998) suggest the followings:

- Banks should hedge the risks which could be skipped out under the conditions of perfect competition in the market
- Banks should hold certain amount of capital in order to cover the risks which cannot be skipped out under the conditions of perfect competition in the market
- Banks should value the risks with less liquidity with a risk aversion as a decreasing function of the proportion of capital kept.

According to Diamond and Rajan (2000) bank's capital structure choice influences not only its stability but also its liquidity-creation and credit-creation functions. "The consequent trade-offs imply an optimal bank capital structure. Because customers rely to different extents on liquidity and credit, bank capital structure also determines the nature of the bank's clientele." (Diamond and Rajan 2000:2431)

Calomiris and Wilson (2004) investigated how banks manage asset risk and capital structure under normal economic conditions and during crisis times for New York banks in the years of 1920s and 1930s. They choose New York City banks for their investigation mainly because those banks attract economic conditions prior to and during the Great Depression. According to their results banks were investing more on risky assets before the Great Depression. Moreover, it was less costly to raise capital before crisis and maintain the less default risk of deposits. Further results of their study show that during the time of Great Depression depositors were more worried about their deposits and pressured the banks to invest in less risky assets. Moreover, banks were forced to cut the dividends in order to raise the capital for decreasing default risk on deposits. This capital raising process was more costly, but on the other hand it provided assurance for the depositors. Capital structure and risk taking behavior in assets return to normal few years after the crisis.

A study by Cebenoyan and Strahan (2004) is interesting in the sense that it explains how different risk offsetting instruments might affect bank capital structure. They mainly investigate how loan sales influence capital structure, lending, profit and risk. The findings show that banks, especially those that are affiliated with large BHCs, which sell loans in order to reduce their risks, hold less capital than others. Their findings is consistent with previous studies about large BHCs' capital structure which indicate that large BHCs hold less capital than other banks. The authors suggest that low capital do not lead to higher risk ultimately, since they are offset by the sales of loans. These operations in fact lead to higher profits by banks which is the ultimate goal of these activities.

According to Peura and Keppo (2006) a bank specialist considers bank capital as a shield or guarantee to overcome future asset risks. Bank capital has to be managed in a proper way which will let a bank to meet its minimum capital requirements even during harsh economic periods. Obviously, not obeying to minimum capital requirements will create extra problems with financing under bad economic conditions. Thus, banks will spend more money to manage their portfolio and it will be difficult to recapitalize its assets. They investigate bank capital from the point of view of bank's manager. The

findings show that delay in recapitalization increases the liquidation risk and the value of recapitalization option increases due to capital raising and dividend policy.

Berger, DeYoung, Flannery, Lee and Öztekin (2008) investigate the capital ratios of large US Bank Holding Companies for years 1992-2006. They mainly investigate how large BHCs in United States determine their capital ratios. Common arguments for holding a bank capital is that, financing capital is costly, therefore banks tend to decrease their capital while they grow. However, the findings by Berger et al. (2008) show that most of the US BHCs are tend to hold more capital than required by legislation. Berger et al. (2008) explain this tendency with BHCs' willingness to be prepared for economic recessions. With this behavior large BHCs also give assurance for their customers for "bad days" and in case of default. The study lacks the information how these BHCs act during crisis time, but it is mainly important in terms of explaining their behavior under normal economic conditions.

Brewer, Kaufman and Wall (2008) study the reason why capital ratios of banks vary in different countries. Since, Basel principles set same requirements for all banks the capital ratios are supposed to show similar patterns in all countries. However, the study by Brewer et al. (2008) shows that they are different. The results show that Basel requirements cannot explain the variation of capital ratios of banks in different countries. These different patterns are mainly explained by bank specific factors. Banks tend to hold more capital in the countries with smaller banking industry, more strict capital regulation and more effective corporate governance. The results also show that Basel regulations are not applied identically in all countries. Therefore, its regulatory role is not implemented homogeneously in all countries.

Fonseca and González (2010) study bank capital buffer determinants across various countries. Firstly, they find out that banks hold more capital if the cost of deposits is higher and their market power is stronger. The authors suggest that this finding leads to conclude about the market's control of itself and it leads to high incentive to hold more capital buffer. Hence, banks voluntarily hold additional capital buffers if market discipline is working well. On the other hand, banks are less willing to hold more capital buffers when the government intervention and supervision is strong. The authors conclude that strong supervision reduces market's power to control itself and leads to imbalances in banks' capital buffers.

In their study of the impact of bank capital on performance Berger and Bowman (2013) investigate how capital affects the performance of small, medium and large banks during different economic cycles. Their findings show that capital is very helpful for

small banks not only during banking and market crisis and also during normal times. It increases the opportunity to prevent economic shocks in all types of crises, either banking or market. Furthermore, capital buffers help medium and large banks basically during banking crises, especially when government intervention is minor. The findings are important to assert the importance of bank capital buffers and its impact on different sized banks.

1.5. Main hypotheses

Relying to these previous studies this thesis investigates the patterns of capital ratios and funding structure of banks before, during and after financial crisis of 2007-2009. It is expected that the crisis has changed the capital structure of banks. Therefore, the following hypothesis is proposed in order to test this:

H₁: The recent global financial crisis has generally affected the capital structure of banks.

Furthermore, it is expected that the crisis has also changed the structure of short-term and long-term liabilities and the following hypothesis suggested in order to test it:

H₂: The recent global financial crisis has changed the structure of short-term and long-term liabilities of banks.

Moreover, in order to test whether the Scandinavian countries were ready for this kind of crises because of their past experience the following hypothesis is proposed:

H₃: Scandinavian countries, particularly Denmark, Norway, Sweden and Finland, are less affected by the recent global financial crisis than other European countries.

Finally, in order to test which countries were affected by the crisis initially and which ones in later stages it is hypothesized that:

H₄: The recent global financial crisis affected initially the countries which are more integrated with US economy.

2. CAPITAL STRUCTURE THEORIES

Ideally capital structure refers to the distribution of resources on the right hand side of a company's balance sheet. It identifies how firms support the left hand side of balance sheet, i.e. assets, by debt and equity. Generally, we are more concerned about debt, i.e. liabilities, because they are more flexible compared to equity. Especially, in the case of banks, equity is more stable compared to other non-financial institutions because of clearly defined regulations. In larger corporations the structure of debt can be complex because of different claimants and the nature of debts, which makes capital structure management more complicated.

Although early theories of capital structure suggest that firms' market values are not affected by their capital structures, later developments had proved their opposite. Now theories agree in one point that the choice of capital affects firm's market value and also risk. In his article in the Wall Street Journal, Milken (2009) states that optimal capital structure develops gradually. Decision makers should consider six factors in the process of formation of optimal capital structure: "the company and its management, industry dynamics, the state of capital markets, the economy, government regulation and social trends." (Milken 2009)

Obviously first theories of capital structure ignore these factors and evaluate firm's capital structure in the terms of perfect market. Further developments show that the factors like bankruptcy costs, taxes, agency costs, and information asymmetry affect firm's value. Having more debt will increase the value of a firm and its riskiness as well. Of course it cannot increase the value of a firm endlessly, therefore the optimal capital structure matters.

Optimal capital structure is explained by various theories of capital structure. It is worth to mention especially, Modigliani Miller theory, Trade-off and Pecking order theories of capital structure. Modigliani and Miller developed first structured capital structure theory and raised interest in this topic. Further theories were aimed to develop MM's theory and draw different tracks in this field of finance. The purpose of this chapter is to explain the main points of these theories briefly and discuss them from banks' perspectives.

2.1. Modigliani & Miller theorem

Traditionally it is believed that there is an optimal ratio of debt and equity when the cost of debt (R_D) is the lowest and cost of equity (R_E) is the highest, and adding up more debt increases firm's value until certain point. At this point the Weighted Average Cost of Capital (WACC, R_A) is in its best position and debt-to-equity ratio is in its optimum. Traditionalists believe that WACC decreases until this optimal ratio and increases thereafter. Brealy and Myers (2003) suggest that the traditional approach could be justified by two arguments. Firstly, investors do not acknowledge the risk formed by additional borrowings but they notice it when they are overlevered. Secondly, inefficiency of the markets allows the borrowing firms to offer beneficial assistance for investors. Therefore, the value of firm's shares should increase by adding up the premium for non-efficient markets. Graphically traditional approach can be described as in the Figure 2.

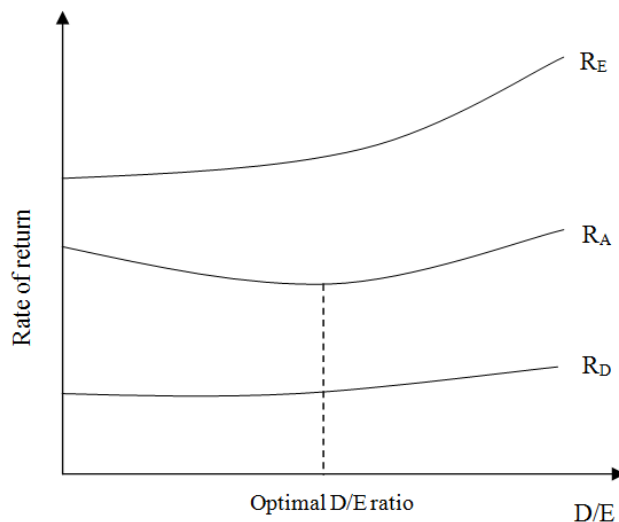


Figure 2. Traditional approach to capital structure. (Brealey & Myers 2003:479).

In contrast to the traditional view of capital structure Modigliani and Miller (1958) claim that firm's value is not affected by its capital structure. Modigliani and Miller's (1958) paper is considered as the first systematic and profound research in capital structure. Marco Modigliani and Merton Howard Miller's paper "The cost of capital, corporation finance and the theory of investment", first published in *The American Economic Review* was the starting point for the subsequent capital structure theories.

However, according to Rubinstein (2003) the first attempt to explain capital structure's importance was made by John Burr Williams (1938). Williams (1938) makes close equivalent of Modigliani and Miller's Proposition I, but his research relies on intuitive results rather than solid proofs, as Modigliani and Miller (1958) claim in their paper. Proposition I of Modigliani and Miller (1958:268) argue that "the market value of any firm is independent of its capital structure" and obtained by discounting its expected return at certain rate proper to its class. Mathematically Proposition I is expressed with the following formula:

$$(1) \quad V_j = (S_j + D_j) = \bar{X}_j / \rho_k$$

Where,

V_j -value of a firm,

S_j -market value of the firm's common shares,

D_j -market value of the firm's debt,

\bar{X}_j -expected profit before taxes,

ρ_k -average cost of capital.

This formula also indicates that the average cost of capital is independent from the structure of capital and calculated as the ratio of average returns and the value of a firm. Proposition II states that, the average cost of capital is helpful for calculating the expected rate of return of the companies with some debt in capital structure. Thus, the expected rate of return is equal to the sum of average cost of capital and premium related to financial risk. Finally, Proposition III argues that the investment decision of any company is independent from the type of security it is being financed by. Thus, a company will carry out the investment decision if the expected rate of return is equal or larger than the average cost of capital. Figure 3 shows the movement of cost of equity (R_E), cost of debt (R_D) and average cost of capital (R_A) as the debt-to-equity ratio increases under Modigliani and Miller propositions.

The expected return on equity (R_E) increases significantly until the debt becomes riskier. The expected return grows slowly after that point and as debt becomes riskier investors demand more return on debt thereafter. However, these developments do not affect average cost of capital, and firm's value as MM's Propositions suggest.

Modigliani and Miller make corrections to their model by adding taxes to propositions in 1963. New model (Modigliani & Miller 1963) suggests that by increasing debt a firm will reduce average cost of capital substantially. Subsequently, the firm can achieve the

highest market value by fully debt financing. However, they argue that although this can be correct mathematically, practically sometimes financing by own capital can be cheaper (retained earnings) than financing by outside sources (debt). Also investors are obliged to pay taxes on their wealth, which will somehow be attributed on debt.

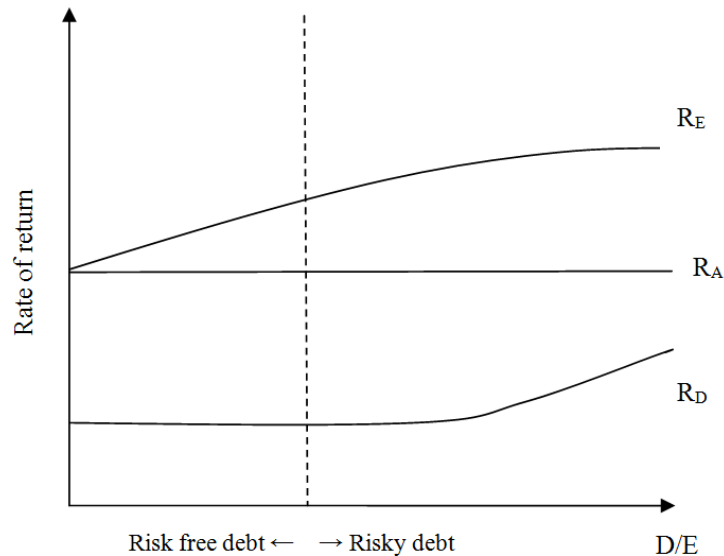


Figure 3. Modigliani-Miller approach to capital structure (Brealey & Myers 2003:474).

Hirshleifer (1966) discusses MM's Proposition I by adding corporate income tax and income tax separately. He argues that holding other things equal, adding income tax will increase the value of equity compared to the value of debt and assets. On the other hand, adding corporate income tax to the Proposition I will let the firms to increase the firms' value by increasing the proportion of debt in their total capital. These suggestions are also identical with Modigliani and Miller's (1963) corrections. Further, Stiglitz (1969) introduces the possibility of bankruptcy to MM's propositions and discusses that, the more a firm issues debt the more it pays interests on it. Moreover, in the case of bankruptcy expected returns will not be the same for all firms and therefore, the value of firms will not be the same as well.

Miller (1977) discusses bankruptcy costs in his paper as the correction to initial MM Propositions, however he states that bankruptcy costs and agency costs are trivial compared to the costs related to corporate and income taxes. The newly modified model

includes corporate taxes, personal income tax for common stocks and personal income taxes for bonds. According to new model tax rates affect gains from leverage significantly, and even high tax rates can turn the gain to negative. Therefore, new model defines new capital structure choice dependent on tax rates, while the old model ignores them. If the tax rate for common stock is lower than the tax rate for holding bonds, then investors will invest more on common stock, and it will be difficult for a firm to borrow, therefore gain from leverage will be lower. The implication of these taxes proves that, they affect capital structure and the value of a firm.

Although Modigliani and Miller theory do not explain capital structure choice for actual market, it was useful in developing further theories of capital structure. MM propositions take into consideration only bankruptcy costs and tax rates in further developments. However, these are not the only factors that affect capital structure choice of firms. Therefore, the model lacks profound explanation of how optimal capital structure should be. Subsequent theories of capital structure try to explain it from different aspects.

2.2. Trade-off theory of capital structure

The trade-off theory is the sum of theories by different authors, where they try to explain capital structure by the gains and expenses of various leverage strategies. It is believed that optimal capital structure is achieved when marginal gains and marginal expenses are in equilibrium. Initially the trade-off theory was stimulated by the discussions around Modigliani and Miller's (1963) theory after adding corporate income taxes. MM's corrections discusses capital structure only by tax perspective and suggest that optimal capital structure can be achieved by fully debt financing. However, this was impossible under real conditions; therefore neutralizing costs for debt financing were required in order to improve the model. (Frank and Goyal 2007)

Kraus and Litzenberger (1973) show different way of calculating the optimal capital structure by introducing the financial distress costs to Modigliani Miller model (1963). They state that optimal capital structure can be achieved by haggling between the tax gains and the costs for financial distress. The market value of a firm with debt in capital structure is equal to the sum of unlevered market value of the firm and corporate tax rate times the market value of firm's debt, less $(1 - \text{tax rate})$ times the present value of the

costs for financial distress. (Kraus and Litzenberger 1973:918) Graphically it can be shown as in the Figure 4.

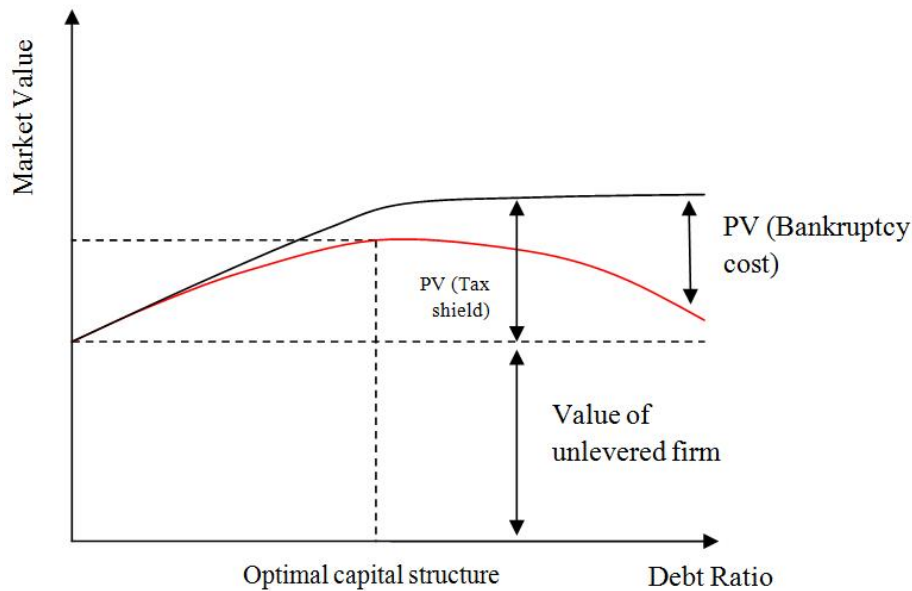


Figure 4. Optimal capital structure according to trade-off theory (Brealey and Myers 2003).

While discussing the static trade-off hypothesis, Myers (1984:577) states that firms always look for optimal capital structure by “substituting debt for equity and equity for debt” until they find the optimum. In order to achieve this optimum firms also make some spending which leads them to optimal capital structure after some period of time. Myers (1984) suggests that firms with high variance of the value of assets should borrow less, since they are considered as relatively riskier. Moreover, firms with more tangible assets are willing to borrow less than those holding intangible assets, because they can easily exchange their assets to cash. These behaviors explain different capital structures of firms with the same market value.

Frank and Goyal (2007:7) suggest that static and dynamic trade-off theory must be distinguished due to the differences occurring from tax code, bankruptcy cost and transaction costs. They define static and dynamic trade-off theories as follows:

“Definition 1. A firm is said to follow the static trade-off theory if the firm’s leverage is determined by a single period trade-off between tax benefits of debt and the deadweight costs of bankruptcy.”

Definition 2. A firm is said to exhibit target adjustment behavior if the firm has a target level of leverage and if deviations from that target are gradually removed over time.”

Bradley, Jarrell and Kim (1984) explain how firms’ capital structures should be under static trade-off hypothesis. In order to build their model they make the following assumptions:

- Investors are risk neutral and they are taxed in a progressive way, however firms are taxed in a constant rate;
- Taxes are based on end-of-period conditions and debts are deductible from taxable amount;
- Along with standard tax shield there are also non-debt tax shields which cuts firm’s tax liability;
- Firms will accumulate costs for financial distress in case they fail to meet the demands of the creditors.

The study is based on cross-sectional analysis of the capital structure of firms from different industries. The results show that as the costs for financial distress and non-debt tax shield increase the optimal leverage decreases, i.e. there is an inverse relationship between them. Also the volatility of earnings and R&D and marketing expenses are inversely related with leverage. Moreover, the findings show strong relation between the leverage and non-debt tax shield, which they call “puzzling” because it disagrees with previous theory. They try to explain this with the securability of non-debt tax shield and with the shortcomings of the cross-sectional analysis. As the authors state, despite few limitations the model itself is interesting in explaining different variations of capital structure of firms from various industries.

Static trade-off theory is unable to explain the factors that affect capital structure over the time. Therefore, dynamic model of trade-off hypothesis was introduced in order to explain missing effects of static model. Capital structure of firms may differ from year to year by their performance, goals and changing conditions. A firm might want to pay dividends for good performance in the end of period, or might want to raise funds in order to make new investments. These affect the structure of capital in the subsequent periods, which can be explained by dynamic trade-off model.

Fischer, Heinkel and Zechner (1989) discuss the dynamic trade-off with the existence of recapitalization costs (transaction costs and agency costs) along with tax and bankruptcy trade-off. Capital structure is fluctuating because of the presence of recapitalization costs. Firms set upper and lower limits for their debt-to equity ratio and try to stay between those lines. When firms earn more they pay back debts, when they reach lower line of debt then they borrow more. Hence, they try to fluctuate within the limits that are set beforehand. Smaller and riskier firms and firms with lower-tax and lower-bankruptcy costs have more fluctuating capital structure. (Fischer et al. 1989:39) The results show that trivial amount of recapitalization costs are able to slow down the process of adjustment to the optimum.

All the developments in the trade-off theory make it better than classic Modigliani and Miller Propositions. Although MM's Propositions are improved by adding tax gain, it still ignores transaction and bankruptcy costs as important determinants of capital structure. Different advocates of trade-off theory expand the research by adding these factors to MM's Propositions to build their new model. New model explains the deviations of capital structure around firms better and defines the importance of bankruptcy costs, transaction costs and agency costs in the process of forming optimal capital structure. Similar to MM's Propositions, trade-off theory cannot explain capital structure choice completely. Therefore, different approach to the capital structure was introduced and developed by various scholars. The next section discusses the main points of pecking order theory of capital structure and its development through time.

2.3. Pecking order theory of capital structure

Classical approach by Modigliani and Miller (1958) and trade-off theory of capital structure rely on market efficiency and equal distribution of information along market participants. However, in practice it is not true and information cannot be reached equally by all market participants. This can be observed thorough the reaction of stock prices to newly released information by firms. The information about a company's dividend payments or the increase in payable dividends can raise its share prices. On the other hand the information about the issuance of new equity can decrease share prices as the investors will be worried about the reliability of the previous price of shares. These movements of stock prices let us make conclusion about asymmetric accessibility of information in markets.

Obviously managers of a certain firm know more than the outsiders, i.e. potential investors, about the firm. Asymmetric accessibility nature of information lets the managers to choose from different sources of financing. Usually managers have different sources of financing like internal funds, debt issuance option and equity issuance option. However, these sources of financing do not have the same “price”; one source offers cheaper money than another. Asymmetric accessibility of information about a firm lets managers to speculate and choose the cheapest source of financing. Thus managers can decide to issue debt or new equity to collect money from external sources. Issuing equity may lead investors to think about the overvalued stock of the company and make difficult to collect target funds. Therefore, issuance of new stock may turn a costly process. On the other hand, a firm can issue a debt in order to collect cash from external sources. Market will consider this news as growing opportunity for the firm and it will not negatively affect the company’s share prices. By knowing this behavior of markets managers will always choose debt for financing if they can choose.

Certainly internally generated cash is the cheapest financing source for any company. Therefore, firms will prefer internal financing if they can choose from all three sources of financing, i.e. internally generated cash, debt and equity. This order of preference of financing is explained by the pecking order theory of capital structure. Figure 5 describes the order of choice for firm’s financing under pecking order theory.

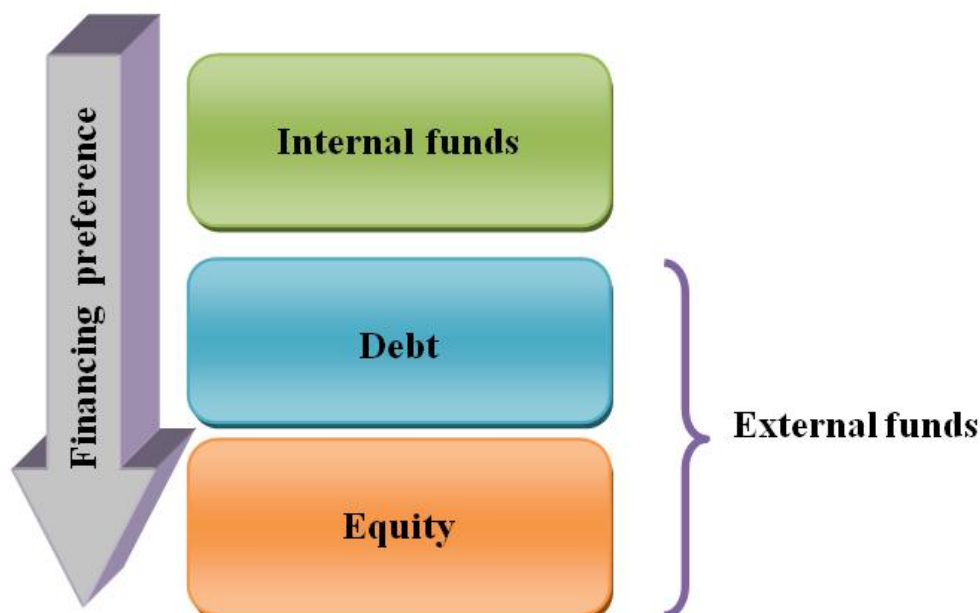


Figure 5. Preference of financing under pecking order hypothesis.

Myers and Majluf (1984) discuss mainly firms' preference of external financing in the existence of asymmetric access to information. They claim that managers would prefer issuing debt to equity in order to raise cash for new investments. Managers' goal is to preserve and increase the wealth of shareholders. Therefore, they are less willing to issue new equity and lower the wealth of shareholders. Moreover, shareholders are less likely to support the plans that lower their wealth. As a result managers will prefer debt to equity as external source of financing. As Myers and Majluf (1984) state, firms should prefer less risky financing; hence they would better issue bonds and raise their equity with retained earnings. They also state that in case of lack of financing and issuance of less risky debt firms should give up investment decisions by acting in the interests of shareholders. Moreover, firms should not pay dividends if they lack cash in order to finance investments. Although dividend announcements could be a good signal about firm's good performance, it may lead to difficulties in future financing by affecting capital structure. One of the main conclusions by Myers and Majluf (1984) is that equity financing will lower the stock price of firm, while debt financing will not. Therefore, they claim that firms should always prefer debt financing to equity, other things equal.

While discussing the existence of asymmetric information Myers (1984) suggests that firms should "issue debt when investors undervalue the firm, and equity or some other risky security, when they overvalue it." This can be a good starting point for investors, which is also applied in practice. Myers (1984:581) states that firms will follow pecking order hypothesis mainly because of the following reasons:

- They choose internal funds,
- They adapt their dividend payout ratios to their investment opportunities, in order to avoid sudden changes in dividends,
- Unchanged dividend policies, erratic changes in profitability and investment opportunities leads to the deficit and surplus of internally generated cash from time to time. If there is a surplus the firm pays back its debts and makes investments to marketable securities, otherwise it collects cash by selling marketable securities,
- When firms have to rely on external funds they should consider the sources from less risky to most risky ones. Thus, firms should follow debt → hybrid securities → equity sequence as a source of financing.

These four factors explain how firms act under pecking order hypothesis in order to formulate their capital structure. Although there is not clearly defined target leverage

ratio in pecking order theory, it explains the differences in capital structures of the firms with the same size and profitability indicators. It explains why firms with different profitability indicators have different attitudes towards leverage. As Modigliani and Miller (1958) suggest, firms can maximize their value by increasing their leverage. However, pecking order theory explains that firms are not always willing to increase their debt if they have enough internal funds. As Brealey and Myers (2003:514) suggest pecking order theory is not able to explain the differences of capital structures of the firms in different industries. Leverage ratios are apparently low in high-tech and fast growing industries when there is a need for external financing. Moreover, it cannot explain the behavior of utility companies of not paying back debts with the surplus of cash. Generally, all the theories of capital structure explain some points of the differences in leverage ratios across industries and firms. All in all they give a profound background for different behaviors in capital structure choice.

2.4. Capital structure choice from bank perspective

Banks as financial institutions differ from other firms of economy. Being financial intermediaries, banks borrow from surplus funds in order to finance deficit in economy. Obviously dependent on the nature of their operations banks have more debt on their capital than any other firm in economy. Therefore standard capital structure theories do not completely hold for banks and they have to be interpreted differently from banks' perspective.

First of all, there are clearly defined game rules in banking sector of all countries. Most of the large economies of the world apply common rules in their banking system defined by Basel Committee on Bank Supervision. Basel Accords on banking defined by this committee is forming the general structure of capital in those countries, hence the capital structure choice of banks show close similarities in these countries. Although the rules defined by this committee are not applied in all countries, generally banks are managed by the central banking system in all countries. Therefore, the existence of regulation leads to homogeneities in capital structure in all countries.

Intuitively it can be claimed that banks are more levered than non-financial institutions because the nature of their operations require borrowing in order to make money. This intuitive claim can be observed from Gropp and Heider (2009) and Frank and Goyal's (2007) papers. Their samples of US and EU banks and US non-financial non-farm firms

show that mean book leverage ratios of these institutions in 2003-2004 years were 93% and 32% respectively. However the leverage ratio of banks was not such extreme in mid 1800s. A study by Berger, Herring and Szegö (1995) shows that aggregate leverage ratios have increased from about 50% in 1840 to its utmost position nowadays. Today's numbers indicate that in general banks have almost ideal capital structure from the point of view of Modigliani and Miller's (1963) approach, since they have achieved maximum debt in their capital structure. On the other hand they cannot achieve 100% debt in their capital structure because of the capital and liquidity regulations by authorities. Banks try to increase their values by employing higher debt, mainly deposits, in their capital, but they are also worried about the costs for financial distress as trade-off theory suggests. Shareholders equity should also behaved as the cost for financial distress, since it plays a role as a guarantee for customers' assurance and loyalty. Supposedly banks' capital structure choice relies mainly on Modigliani and Miller's (1958) propositions and trade-off theory.

While discussing optimal bank capital structure Diamond and Rajan (2000) argue that capital (equity) is important for banks in order to cover credit losses in bad economic conditions during bank runs. Banks have to negotiate with depositors during bank runs, which is costly, time demanding and mostly impossible process (because of high number of depositors). Bank capital is employed in this case in order to overcome these hardships with fewer losses. Apparently holding equity is important for all counterparts of bank transactions. Diamond and Rajan (2000) state three effects of bank capital (equity) which define its role in bank's capital structure: more capital increases the "guarantee" for crises; it increases the opportunity to attract new deposits and affects the amount that is paid back by borrowers.

Marcus (1983) argues that optimal capital structure for banks is achieved through trading-off between marginal benefits and marginal costs. He also states that Modigliani and Miller's (1958) propositions do not hold for banks because in practice there are capital and deposit regulations and other costs for financial distress which affect banks' capital structure and their market value. US tax system allows banks (not only banks) to increase their leverage in order to increase their market values. Since the main proportion of debt in bank's capital structure constitutes deposits, there are associated insurance costs with them. Banks can increase their leverage by increasing insurance payments to Federal Deposit Insurance Corporation (FDIC), which seems to be a costly process. Fund raising through deposits is offset by mainly rising riskiness of the bank and bankruptcy probability. Furthermore, centralized regulation requires auditing costs and may lead the suspension of FDIC membership in the case of not meeting the

requirements. Therefore, Marcus (1983:1219) suggests that by overcoming the regulatory obstacles bank “maximizes its value by increasing equity to the point at which the marginal value of reduced regulatory pressure and potential bankruptcy costs equals the marginal tax disadvantage of equity finance.” Marcus (1983) concludes that in order to maintain more effective regulation central governments should take into account changing economic conditions while setting new capital adequacy ratios and insurance rates for deposits. Mainly Marcus’s (1983) approach to optimal bank capital structure is explained by trade-off theory.

According to Flannery and Rangan (2004) while non-financial institutions try to adapt their capital structure to changing market conditions, banks must take into consideration also regulations by central authorities. This characteristic makes for a banker to predict optimal capital structure more difficult. They also state that capital structure choice is affected by the size of a bank as well. Large banking companies are more likely to meet the capital adequacy and liquidity requirements through more diversified operations, which let them to reduce riskiness. Therefore they can increase leverage more easily compared to small banks. Hence, capital and liquidity regulations might not affect large banks much and their capital structure choice can be similar to non-financial firms with the limitation of equity.

Berlin (2011) argues that banks set explicit capital targets and try to achieve it through time. This is what says dynamic trade-off theory, therefore it can be stated that banks mostly follow dynamic trade-off model of capital structure. This can be justified by observing banks’ behaviors by taking into account several subsequent years. Previous studies also show that banks try to adapt changing economic and regulatory conditions. By having more factors affecting their attitudes, banks apparently have more precise target capital than non-financial firms.

The study by Peura and Keppo (2006) also tries to explain banks’ capital structure choice from the point of view of dynamic trade-off theory. They argue that, capital structure choice for banks, first of all, is a risk controlling behavior and banks consider capital as a shield for future financial distresses. Peura and Keppo (2006) firmly claim that bank’s capital structure choice is the choice which is dominated by regulations under minimum capital systems. However, previous studies show that minimum capital is not a case if the size of a bank is large. Economic conditions also affect bank’s capital structure as Flannery and Rangan (2004) state. Therefore, this extreme statement by Peura and Keppo (2006) cannot be applied to all banks but small sized.

Apparently, most of the approaches to bank capital structure are trying to explain it by trade-off theory. Since, banks have precisely defined capital adequacy ratios set by regulators they are trying to find optimal debt to equity choice by bargaining between the factors affecting these two. As debt is mainly formed by deposits banks are trying to increase their deposit customers. On the other hand deposit insurance regulations do not let them use all amount of attracted funding by applying minimum reserve requirements. Moreover, debt itself is offset by capital (equity) regulations. Hence, optimal capital structure of a bank is achieved by adjusting debt and equity to the game rules set by regulators and changing economic conditions.

3. BANK CAPITAL, FUNDING STRUCTURE AND REGULATIONS

This chapter identifies main issues on the bank capital and its supervision. Firstly, the importance and necessity for holding capital for banks are explained and their calculation methods described. Further funding structure of banks is discussed briefly. The third section of this chapter clarifies origins of bank regulations and its development through history. This section also illustrates evolution of Basel bank regulation principles and the need for the new changes. Finally, the different bank regulation and macroeconomic regulation approaches are explained for various countries.

3.1. Why bank capital is important?

As it was discussed in the previous chapter, firms (also financial firms) would like to maximize their profits by increasing their debt until they reach the 100% debt financing. However this is impossible in reality, therefore they are willing to keep debt as high as they can. In banking industry this attitude is offset by clearly defined capital regulatory rules. Since banks are more entwined with whole economy they are more sensitive to changing economic conditions. Although countries which stick to classical capitalist approach did not have tight rules for bank regulation, the recent financial crisis made them to think about their choice again. Hence, as being the main instrument of bank regulation capital regulation became more important in recent years.

It is important to mention that shareholders are more worried about common stock in the right hand side of a bank's balance sheet because their wealth depends on its quality. Acting as the main source of shareholders' wealth, capital carries out six important functions as Rose and Hudgins (2008) state. Firstly, capital acts as the buffer for financial crises. Holding enough capital required by regulations lets banks to prevent initial consequences of possible crises. Capital absorbs the first shocks and lets banks gain enough time to decide the ways to overcome further shocks. Secondly, capital is necessary in order to establish a bank and earn license for banking operations. It maintains initial activities such as buying offices, hiring employees, paying administrative costs in the first stages of banks' formation.

The third function of capital, as Rose and Hudgins (2008) state, is public assurance. Capital provides assurance to general public and also for government that the bank is strong enough to satisfy all its counterparts, i.e., borrowers, lenders (depositors), investors, and etc. Higher capital ratios make a bank more reliable for depositors. This is also important for banks themselves because deposits are the main source of debt in their capital structure. The assurance role of capital and trust of depositors provide additional funds for banks and derives capital's fourth function: growth and diversification of business tool. High capital lets banks to expand their business and also shift their activities from classical banking to new innovative banking operations.

Another function of the capital is its growth regulatory role. While banks grow, their capital decreases compared to their liabilities. Therefore, they have to increase their capital through several ways. Obviously, raising capital is costly and it is not very easy for banks to attract new capital. Hence, this restriction somehow prevents banks from over growing and maintains sustainable gradual growth. Finally, bank capital acts as the guarantee for the government in the case of the bank's failure in order to pay back some proportion of claims. Hence it has also a macroeconomic importance along with all above mentioned functions.

Although major concerns of shareholders are about the quality of common stock, it is not the only component of bank capital. The components of capital can be classified as follows: (Rose and Hudgins 2008)

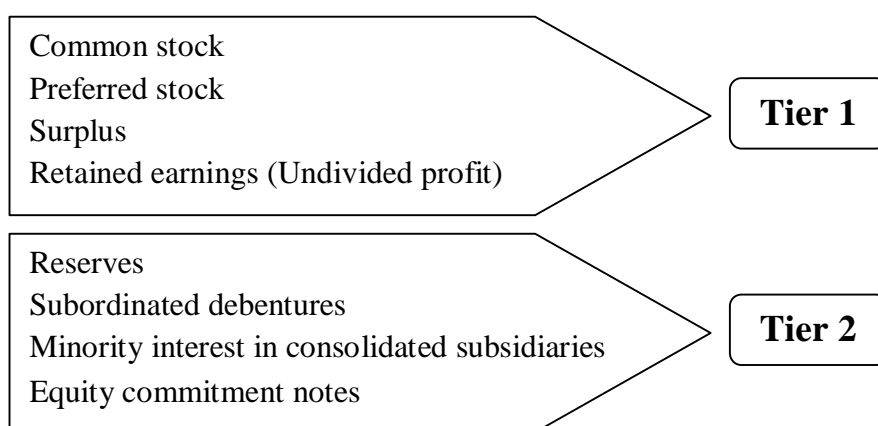


Figure 6. Components of bank capital.

Of these components of capital common stock, preferred stock, surplus and retained earnings belong to Tier 1 capital, the rest consist Tier 2 capital. Also common shares in

consolidated subsidiaries are included in Tier 1 capital. It is crucial to distinguish between these two because banks calculate their capital ratios according to this classification. Common stock or common shares are the shares issued at par value and giving dividends according to the performance of a bank. Board of directors decides whether to pay dividends to shareholders or not. On the other hand, preferred stock pays fixed dividends to its holders and they are issued with certain maturity. Surplus is the difference between share's par value and market value when stock price is higher than par value. Retained or undivided earnings are the earnings that are retained from bank's activities and not paid out as dividend. They might be used for future activities, can be paid out as dividends or be capitalized by issuing new stock. Reserves or loan loss provisions are the money that is allocated for probable loan losses. Reserves created for certain purposes, such as paying declared dividends or debt obligations occurring from past activities, also included in the capital. Subordinated debentures are the claims by investors which are junior compared to depositors' claims. Minority interest is the proportion of shares of a consolidated company which is not owned by the parent company. Equity commitment note is the type of security which lets the holder to sell certain proportion of common or preferred stock in the future. (Rose and Hudgins 2008, BCBS 2011)

Basel Accords on bank regulation gives more precise description of these components of capital. The definitions have been improved through the evolution of Basel regulatory standards. Hence, ambiguous definitions in early Basel standards had let banks manipulate while calculating capital ratios which lead inaccurate information about banks' safeness. Capital elements composing Tier 1 capital are considered safer capital which can be reached immediately in case of need. On the other hand, the elements composing Tier 2 capital are less reliable and it might take longer time to collect them in order to meet the claims. Banks calculate several capital ratios deriving from the Basel Accords. Two main capital ratios are Tier 1 capital ratio and Total capital ratio or Capital Adequacy Ratio (CAR). Additionally banks calculate Equity Tier 1 capital ratio and Core Tier 1 capital ratio. The formula for calculating Capital Adequacy Ratio is as follows:

$$(2) \quad CAR = \frac{\text{Tier 1+Tier 2}}{\text{Risk weighted (on balance sheet + off balance sheet) assets}}$$

Risk weighted assets are calculated according to the defined risk weights by Basel Accords. In order to calculate risk weighted assets the assets are multiplied with their corresponding risk ranges. Capital Adequacy Ratio lets to draw general image about a bank's readiness to meet its liability claims, credit risk, liquidity risk and other risks associated with the bank's operations. The calculation of Tier 1 capital ratio is similar to the calculation of CAR. It only excludes Tier 2 in order to measure the adequacy of more reliable resources that bank own. Additional capital ratios such as Equity Tier 1 and Core Tier 1 include some elements of Tier 1. Hence, Equity Tier 1 capital ratio includes common equity and retained earnings in the numerator. This is the most reliable capital adequacy ratio because common equity and retained earnings are the most stable funds for banks in case of any crises or shocks. Core Tier 1 capital ratio includes silent participations along with common equity and retained earnings in the numerator. Silent participants are the investors holding certain amount of stock of a bank and sharing profit or loss along with other shareholders. They mainly do not participate in decision making. However, they can also participate in this process if approved by both sides beforehand. All these aforementioned capital adequacy measures calculate different components of capital relevant to the riskiness of assets, i.e. the capital is compared to risk weighted assets. Banks also calculate Tier 1 leverage ratio which measures the ratio of Tier 1 capital to bank's consolidated on-balance sheet and off-balance sheet assets (non-weighted for risk).

These ratios are important measures in order to identify how ready a bank is to face the risks deriving from its activities. Major risks that banks can face are Credit Risk, Liquidity Risk and Interest Rate Risk. Moreover banks face risks associated with exchange rates, operations, fraud etc. Credit Risk evolves from a bank's counterparts' failure to accomplish responsibilities deriving from the contract. Thus, when borrowers fail to pay-off their loans, bank in its turn is not able to pay depositors' interests. Therefore, capital ratio is altered in this case, which affects the bank's safeness ultimately. Liquidity risk measures how fast a bank can satisfy its claimants. It assures that a bank holds enough cash and cash equivalents in order to meet claims in a relatively short time. Interest Rate Risk maintains the risk occurring from the average lending rate and average borrowing rate. Market rates might change due to changing economic conditions; therefore it is crucial to manage this risk continually. Other risks such as operational risk, exchange risk and fraud risk can be faced during daily activities, which are the result of internal-operational and fraud risk, and external, exchange rate factors. Managing these risks is an integral part of capital regulation. (Rose and Hudgins 2008)

Generally, bank capital issues play central role in banking and bank regulation. Wall (1985) mentions three important functions of capital regulation. Firstly, capital is needed to be regulated in order to reduce the risk of bank failures. Secondly, it provides public assurance. And finally, capital regulation reduces the possible losses for a government deriving from deposit insurance. The third section discusses how these needs changed capital regulation over history, its current conditions and future prospects. (Rose and Hudgins 2008)

3.2. Funding structure of banks

As discussed in the pecking order theory of capital structure firms prefer internally generated cash flows first when they need additional finances in order to maintain their activities. By understanding the nature and scale of banking activities one can see that internally generated cash is not enough to finance banks' activities. Therefore, banks mainly rely on external sources of financing and specifically on the debt. Structure of the liabilities of banks provides very good information about how important the funding is for banks. The following is the structure of a banks debt (or funds) in balance sheet according to Rose and Hudgins (2008:138-139):

- 1) Short-term liabilities
 - a) Deposits
 - i) Demand deposits
 - ii) Time deposits
 - iii) Money market deposits
 - b) Non-deposit sources
 - i) Borrowings from a central bank
 - ii) Repurchase agreements (repo)
 - iii) Commercial paper market (e.g. bonds)
 - iv) Borrowings from international institutions
- 2) Long-term liabilities
 - a) Long-term borrowings (savings deposits etc.)

As seen from the structure of liabilities deposits occupy important place in a bank's funding. Therefore, banks always trade-off carefully between cost and gains of collecting deposits while raising funds. Deposits have crucial impact on liquidity risk by being a short-term funding for long-term assets. Hence, the majority of deposits are

short-term deposits such as demand deposits, money market deposits, and other non-interest bearing deposits.

Generally, all banks offer two types of deposits, interest bearing and non-interest bearing deposits, which form most of their liabilities. Share of non-interest bearing deposits in banks' balance sheet has increased significantly in recent years (Rose and Hudgins 2008:388-389). This happened mainly because of the increase in the number of checking (current) account customers and new regulations on payments systems. For instance, in many countries legal entities are required to have a settlement account with a bank in order to start a business. Moreover, increase of international trade in last 20 years has increased the number of correspondent accounts, current accounts for banks, and interbank transactions.

Non-interest bearing deposits are usually low-cost source of funding for banks; however, it is not as stable as interest bearing deposits. While new regulations and changing economic conditions help to increase non-interest bearing deposit customers without much effort, banks try to raise funds through more stable deposits. Therefore, interest bearing deposits require stricter management and are more costly. As the cost of deposits affect the price of bank loans, managers carefully take into account market conditions and competitiveness of the offered interest bearing deposits. Moreover, as a main source of funding, deposit management is the part of liquidity risk management of banks.

While discussing deposits' role in liquidity risk management it is important to mention key ratios related with deposits. These ratios are core deposit ratio, deposit composition ratio and deposit brokerage index. (Rose and Hudgins 2008:362) Core deposit ratio measures the ratio of core deposits to total assets. Core deposits are the ones that are less likely to "leave" the bank in a significantly short period. These mainly include savings accounts and low amount checking accounts. These deposits are less sensitive to interest rate changes either because of their longer terms or trivial amounts and non-interest bearing characteristics. The more is core deposit ratio the less is the probability of liquidity risk.

Deposit composition ratio measures the share of demand deposits in total time deposits. Demand deposits can be withdrawn at any time, whereas time deposits can be withdrawn at the maturity time. Similar to core deposit ratio higher deposit composition ratio indicates the existence of more stable funds. Therefore, bank managers want to keep this ratio in the minimum threshold level. These levels might change for different banks, since it is bank's choice whether to hold higher proportion of easy access

demand deposits or rely mostly on more stable funds. Deposit brokerage index measures the ratio of brokered deposits to total deposits. Brokered deposits are deposits which are pooled from different deposits and sold to third parties. Banks receive higher interests for brokered deposits however they are quite unstable and high brokerage index indicates high liquidity risk. (Rose and Hudgins 2008)

Other sources of funding such as borrowing from central bank, repos, bond market, and interbank borrowings are also important for fund raising. These sources of funding are usually short-term borrowings and are useful to carry out the goals associated with significantly short-period activities. On the other hand, during economic downturns, and the loss of trust to banks by public these sources become crucial for banks. Therefore, funding choices and structure of banks vary significantly during different periods of economic cycle. As a rule during economic crises customers withdraw their deposits from banks because of future uncertainty and pessimistic expectations. Convincing the customers to keep their deposits with the banks becomes very costly and in most cases impossible, and banks search for other less costly funds. Therefore, share of short-term funds usually increase during economic downturns. These characteristics of banks' short-term and long-term liabilities are useful in order to explain empirical findings in the next chapters.

3.3. Evolution of bank regulation

Although banking activities close to modern banking were being carried out in Europe starting from 12th century, regulation of these activities was not the case during those times. Like all other business activities banking was also being protected by general laws. Scale of these activities was not such large as today; therefore there was no need for specific supervision. As paper money replaced metal money banks expanded their activities and occupied larger proportions in their national economies. Invention of different kind of securities stimulated the development of bank sector in further stages. Need for supervision of banking system soon became inevitable since bank activities influenced economies by being main financiers. First central banks were formed in order to finance government projects, which included mainly wars, trade and commerce.

World's first central bank is considered Sveriges Riksbank which was established in 1668. (Sparve 1998:345) This bank was formed as a joint stock bank with two departments: one responsible for lending government funds and another responsible for

clearing activities. Established in 1694, Bank of England was more powerful than Swedish central bank. Originally it was aimed to finance Britain's long lasting war with France by purchasing rising government debts. Further central banks established in other countries of Europe, America, Japan and former colonies of British Empire adopted Bank of England's model. Along with financing government activities, first central banks were also involved in other banking activities like commercial banks. They also provided secure vault system for the deposits of other commercial banks. By increasing power of central governments and rising importance of banking sector central banks became more influential. Thus, their influence area grew significantly as they evolved through their first establishments. (Bordo 2007, Kindleberger 2009:66)

Bank supervision did not require many efforts when first central banks were established. Since monetary systems were tied to gold reserves, banks were allowed to issue loans equivalent to the value of gold they possess. Therefore, it was enough for central banks to check the availability of gold resources of banks in order to decide whether they act according to rules or not. Moreover, as the amount of money supply in economy was tied to gold reserves, prices were also tied to gold through this system. Hence, prices in economy as a whole were sensitive to the price of one commodity-gold. Therefore the major goal of bank supervision during those times was to provide price stability in economy. (Bordo 2007)

Traditionally bank regulation in Europe was different from US in the way that regulatory rules in US are written clearly and there are strict punishments for violating these rules. However, bank regulations in European countries have mainly advisory characteristics and banks are mainly free in their activities unless they are of criminal actions. Although Bank of England was one of the oldest central banks in the World, it served primarily as British Government's bank and was chartered to print banknotes. Nevertheless, changing conditions of economy made the government to think about applying some regulations to banking sector. Thus the first important legal act to regulate activities of banks was Banking Act of 1979. The act defined institutions which can accept deposits and therefore clearly draw the line between bank and non-bank institutions.

Banking Act of 1987 improved and replaced the act of 1979. It defined the regulatory actions for deposit taking institutions, introduced deposit protection scheme and provided explanations of banking institutions. Further this act was replaced by the Financial Services and Markets Act 2000. FSMA 2000 defines game rules for financial institutions more clearly than previous acts. This act also defined the duties of Financial

Services Authority which was established in 2001 and became one of three bank regulatory bodies in UK-Bank of England, Financial Services Authority and Treasury. However, miserable consequences of the recent financial crisis made the British government to look through its banking regulatory policies and FSA was replaced by two different institutions: Prudential Regulation Authority and the Financial Conduct Authority in 2013. The British government also passed the Banking Act 2009 which lets government to take over banks temporarily when needed. These latest developments in bank regulation in UK changed the traditional way of controlling bank activities.

Although there were several attempts to set a control over banking sector in US, it was not systematically carried out until the establishment of Federal Reserve System in 1913. The First and Second Banks of the United States were first government banks of US. However their charters were not supported and prolonged for further periods. There was a time period without bank regulations, when banks in each state printed their own banknotes. This caused inflation increase and mess in financial system. Panic of 1907 raised the discussions about the necessity for a central bank of the United States. It was the time when stock indices fell significantly and it accompanied with rush bank runs. (Minneapolis Fed 2013)

Federal Reserve System was established in 1913 in order to regulate US banking system. However, the Great Depression revealed that Fed is not providing efficient bank regulation. The Glass-Steagall Act of 1933 established Federal Deposit Insurance Corporation and drew a line between commercial and investment banking. Banks should define clearly which activity they will carry out, investment banking or commercial banking, thereafter. Moreover, they must keep some amount of their deposits in FDIC as a guarantee for possible future crises. (Walter B. Wriston Archives 2007)

Despite these developments there have not been clear capital adequacy ratios for banks in US until 1980s. US government was concerned about decreasing capital ratios of large banks. Therefore, new acts on bank regulation were passed in order to improve capital regulations. Figure 7 shows how the proportion of equity in banks' capital has fallen from 1840. It might be claimed that creation of FDIC had negatively affected banks' equity. Thus, securitization of deposits by government with trivial amounts let banks to attract more deposit customers, i.e. deposits became less costly. (Minneapolis Fed 2013, Tarullo 2011, Walter B. Wriston Archives 2007)

Increasing importance of international financing and deepening integration among countries through international organizations made big industrial nations think about

common regulation standards in banking in late 1980s. Consequently the Group of Ten (G-10) countries agreed on common banking regulations in 1988. Basel Committee on Banking Supervision (BCBS) which was established by these countries in 1974 adopted the common standards for bank regulation, which is mainly known as Basel I. These standards set capital requirements for banks and differentiate risk weights for assets of banks. Basel I sets the minimum capital ratio for banks as 8% of risk-weighted assets, where at least 4% must be covered by the Tier 1 capital. (BCBS 1988, Santos 2001)

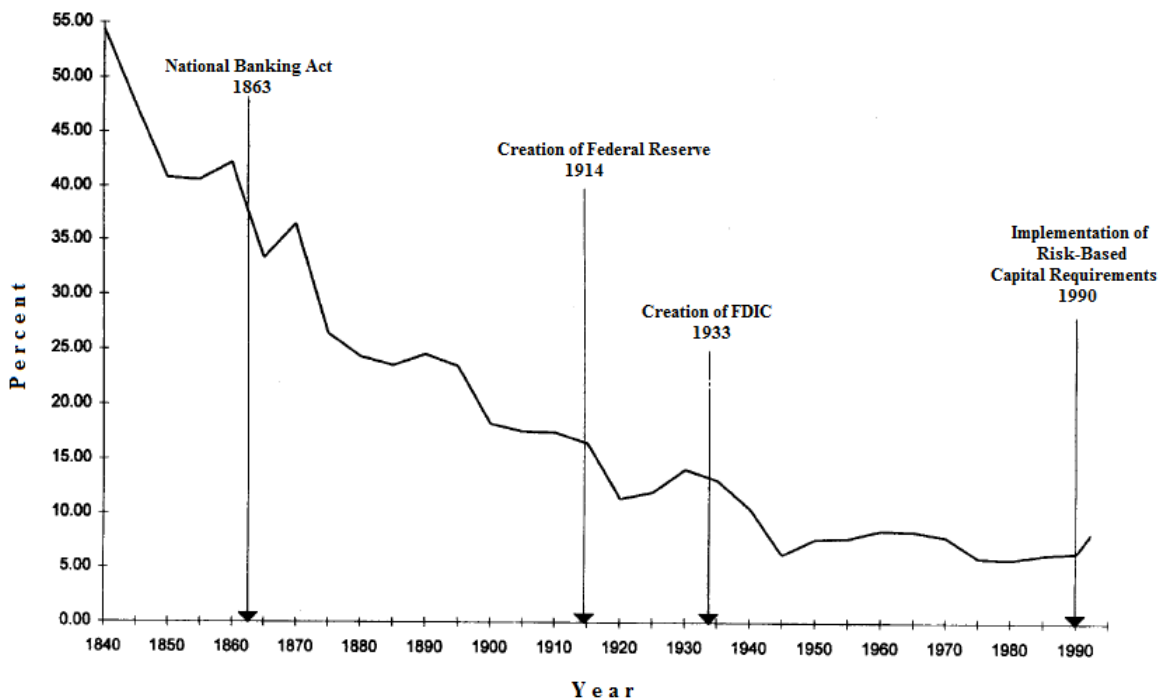


Figure 7. Equity as a percentage of assets (Source: Berger et al.1995:402).

Although there are different kinds of risks in banking Basel I primarily focuses on the most important one-credit risk. It also distinguishes among assets by country transfer risk which defines OECD countries less risky. Though central governments and central banks of all other countries are also recognized to have zero risk according to Basel I, claims on other industries are distinguished according to the riskiness of specific country. Basel I defines bank assets to have a failure risk with 0%, 10%, 20%, 50%, and 100%. It also distinguishes between on-balance sheet and off-balance sheet assets for calculating risk weighted assets. Off-balance sheet assets are converted to their on-

balance sheet assets in order to make calculation possible. Risk-weighted assets can be summarized as follows:

- Assets with 0% risk-cash, debts of central governments and central banks of OECD and any other countries,
- Assets with 0%, 10%, 20% and 50% risk-claims on public sector except central governments,
- Assets with 20% risk-debts of international development banks, debts of OECD banks, debts of banks outside OECD with remaining maturity up to one year, debts of non-OECD public sector companies and cash in collection,
- Assets with 50% risk-residential real estate collateralized loans,
- Assets with 100% risk-All other assets including private sector debt, private sector debt of non-OECD countries with maturity more than one year, PPE, etc. (BCBS 1988)

Apparently first Basel Accords were lacking more accurate calculation of asset risks and they were not dealing with other important risks that banks face. Although there were some amendments to Basel I in further years there was a need for more sophisticated rules in bank regulation. Hence, second Basel Accords were introduced in 2004 and became legally active in EU with the Capital Requirements Directive.

Basel II consists of three pillars of bank regulation: Minimum capital requirements, Supervisory review process and Market discipline. The first pillar-Minimum capital requirements-introduces accurate methods for calculating minimum capital. It enhances Basel I by distinguishing among two more risks for banks along with credit risk; these are operational risk and market risk. Credit risk can be measured by standardized approach, internal ratings-based approach and advanced internal ratings-based approach. Operational risks rise from the probability of the failure of software systems, unintentional hazards by employees, i.e. extraordinary actions. Basic indicator approach, standardized approach and advanced measurement approach are three methods that Basel II suggests to measure operational risks. Finally, market risk can be measured by standardized methods and internal models approach. (BCBS 2006, ANZ 2011) Moreover, Basel II provides formulas for calculating these risks.

The second pillar of Basel II provides guidance for bank regulators in order to control if banks follow the rules set by the first pillar. It identifies more risks related to bank operations, such as concentration risk, interest rate risk, liquidity risk, strategic risk, reputation risk etc. It also defines corporate governance standards for banks. Finally, the third pillar of Basel II aims to provide more information about bank's operations in

market in order to maintain transparency. This will let the counterparts to measure and evaluate the failure risks more accurately. The last pillar is also important in order to prevent illegal bank actions like money laundry, financing of terrorism and illegal weapon trade. (BCBS 2006)

Despite the fact that it was legally applied in EU, many scholars and finance people criticized Basel II because of its risk based approach to assets. Thus, opponents of Basel Accords claim that its rating based approach caused high reliance on rating agencies which loosened the process of lending. Banks choose to trust to rating agencies rather than spending time on evaluating their risks themselves. Also complexities of innovative financial instruments led banks to follow this attitude. Therefore, there was information gap between banks and its customers. Moreover, the rules set by Basel II were too complicated that it took several years for large banks to adopt it. Apparently, concerns of scholars were justified when Basel II could not prevent the severe results of the recent financial crisis.

The third Basel Accords introduce tighter capital requirements for banks. First of all, Basel III gives new definition of capital, where some capital instruments are excluded from Tier 1 and Tier 2 capital. Hence, recent financial crisis revealed that some capital instruments like, deferred tax credits, goodwill, complex bonds “evaporating” during recessions and are no longer liquid in order to pay for bills. Secondly, Basel III introduces new capital classification for anti-crises purposes such as capital conservation buffer and countercyclical buffer. Banks must maintain extra 2.5% capital as a buffer for future possible crises in addition to its total capital. The ratio of total capital is not changed and remains 8%, however there is a shift to Tier 1 capital. Thus, Tier 1 capital must be at least 6%, while it was only 4% during previous Basel regimes. Additionally, Basel III gives right to bank supervisors to ask banks hold more capital during rising credit growth. This capital is called countercyclical buffer and it may vary between 0% and 2.5%. Therefore during credit booms banks’ capital might rise up to 13% which is much higher than all previous capital requirements. All these ratios are measured by risk-weighted assets. In addition to these ratios there is another capital ratio set by Basel III, called elaborate ratio which measures the ratio of capital to total consolidated assets without risk weighting; it must be minimum of 3%. (BCBS 2011)

Basel III also introduces absolutely new regulation tool which was not available in previous accords. Banks must meet the minimum amount of Liquidity coverage ratio (LCR) in order to guarantee short-term shocks. Basel III requires banks to have LCR of 100% by the end of the year of 2018. Another instrument of liquidity regulation is Net

stable funding ratio (NSFR) which requires minimum amount of stable funds in order to guarantee sufficient resources. This requirement is suspended until the end of 2017. (BCBS 2011) Figure 8 shows the timeline for the new capital and liquidity requirements to be met by banks.

Phases	2013	2014	2015	2016	2017	2018	2019
Leverage Ratio		Parallel run 1 Jan 2013 – 1 Jan 2017 Disclosure starts 1 Jan 2015				Migration to Pillar 1	
Minimum Common Equity Capital Ratio	3.5%	4.0%		4.5%			4.5%
Capital Conservation Buffer				0.625%	1.25%	1.875%	2.5%
Minimum common equity plus capital conservation buffer	3.5%	4.0%	4.5%	5.125%	5.75%	6.375%	7.0%
Phase-in of deductions from CET1*		20%	40%	60%	80%	100%	100%
Minimum Tier 1 Capital	4.5%	5.5%		6.0%			6.0%
Minimum Total Capital				8.0%			8.0%
Minimum Total Capital plus conservation buffer		8.0%		8.625%	9.25%	9.875%	10.5%
Capital instruments that no longer qualify as non-core Tier 1 capital or Tier 2 capital							
					Phased out over 10 year horizon beginning 2013		
Liquidity							
Liquidity coverage ratio – minimum requirement			60%	70%	80%	90%	100%
Net stable funding ratio							Introduce minimum standard

* Including amounts exceeding the limit for deferred tax assets (DTAs), mortgage servicing rights (MSRs) and financials.

Figure 8. Basel III phase-in arrangements. All dates are as of 1 January (Source: BIS).

Additionally to all capital requirements Systematically Important Financial Institutions (SIFIs) must hold extra 1%-2.5% capital depending on their systemic importance in

order to meet loss absorbency requirements. SIFIs are the financial institutions whose failure might cause extremely severe losses not only for financial sector but also for whole economy. Collapse of Lehman Brothers and its consequences made the bank supervisors to pay more attention to these institutions. SIFIs are defined each year by Financial Stability Board according to clearly stated measurement tools.

New very strict requirements agreed by the governments of 27 countries were not welcomed by the bankers of those countries. Obviously, new rules made it significantly expensive for banks make money. Therefore, there were long lasting discussions around new regulations. Some large banks, especially US ones called new rules unacceptable and impossible to meet. Specifically JPMorgan Chase CEO Jamie Dimon called new rules “blatantly anti-American” and asked US government not to apply new rules in US. In solidarity with US bankers some congressmen called US Senate not to pass the bill adopting new Basel Accords obligatory in US. Antagonists of Basel III also claimed that new rules will cut about 10 million jobs and will slow economic growth. Moreover, many banking associations in US warned that small community banks cannot adopt new standards because it will be difficult for them to collect capital. A study by PwC shows that capital ratios of some large us banks including JPMorgan Chase were lower than required by new standards. Therefore it is obvious why they opposed new requirements. Despite these opposing attitudes in US, British and Swedish governments welcomed new rules and announced that they want to apply more strict rules for their banks, as banking and financial sectors occupies significantly large proportion of their economy. Consequently all the developments made BCBS to prolong the deadline for meeting the liquidity requirements. (Kanter and Castle 2012, Sorkin 2013, Masters 2013, PwC 2011)

3.4. Different practices in bank regulation

Although Basel Accords set clear game rules for the banks of participating countries there are still many differences in bank regulations across these countries. This is mainly because of the different evolution ways of banking industries through history affected by local conditions divergently. Traditionally banks were affected much by regulations in the countries with social-democratic economic models. In contrast banks in liberal economies such as UK and US have not faced strict regulations from the beginning of their operations. However recent financial crisis made liberal economies

also shift to stricter regulations in banking sector. Therefore, it is important to pay attention how banks are regulated and supervised in different countries.

Banking system of the European Union constitutes many financial institutions operating in both macroeconomic (union) and microeconomic (countries) levels and characterized by the complexity of regulations. Main institution for bank regulation and supervision in the European Union is the European Banking Authority (EBA). Main goals of EBA are to maintain safe and sound banking system, provide common prudential rules for all EU banks and evaluate risks and susceptibility of EU banks. While EBA's main role is to provide advisory and supervisory services EU legislations ensure compulsory rules for all EU banks. National authorities are responsible for implementing and supervising EU legislations for their banks. Bank regulatory and supervisory authorities in almost all EU countries are similar. Thus they consist of National (Central) Banks and Financial Supervisory Authorities. National Banks consider EBA's recommendations and apply EU rules for bank regulations in local level. Moreover, they can set stricter capital and other adequacy requirements than set by EU legislation for the banks in their own jurisdiction if they believe it will provide more secure banking system. Norway, Iceland and Switzerland which belong to Europe geographically but are not EU members also have similar banking system. However EU legislations and other EU bank regulatory bodies are not able to affect their bank regulation choice. Despite this all these countries apply common regulatory rules set by Basel Committee on Bank Supervision and therefore have similar approach to capital adequacy requirements.

Being the main authority responsible for financial stability in Euro zone, European Central Bank also sets certain rules for the participants of financial sector. Along with capital requirements Minimum Reserve Requirement is one of the main tools to maintain macroeconomic stability. European Central Bank is the responsible body for defining Minimum Reserve Requirements. Despite the fact that this tool is applied in almost all countries and is of utmost importance, some countries do not use it at all. Historical development of UK economy and traditional capitalist approach led to loose regulations in financial sector as well. Not only the Bank of England did not set the minimum reserve requirements, it did not even define clear capital regulation rules from the beginning of banking industry. Banks are not obliged to keep some proportion of deposits in the accounts with the Bank of England; however they can do so and receive interest for holding deposits in BoE. Similar to UK Norwegian and Swedish central banks do not apply MRR regulatory tool for banks as well. Nevertheless, Central Bank of Norway or Norges Bank defines thresholds for holding deposits in its accounts for the banks operating in Norway. So called Quota System allows banks to get interests for

defined portions of the deposits that they hold in the accounts with Norges Bank. Banks who hold more deposits than set by Quota System get lower interests for the proportions exceeding the quota. This system stimulates banks not to hold large amounts of deposits and expand their businesses. (Øystein 2013)

Another noteworthy tool of bank capital regulation is setting up minimum initial capital standards for starting banking business and also setting minimum equity capital standard for existing banks. This tool should be distinguished from minimum capital adequacy ratios in the way that it sets capital requirements in the terms of currency. For instance, country A may set a minimum initial capital requirement for those who want to get a bank charter of 1000 euro. This requirement will be minimum equity capital requirement for already existing banks. The tool is widely used in the economies with weak banking industries and in those who newly introduced market economy. Thus, minimum initial capital requirement is applied as a strong regulatory tool in CIS countries. For instance, in Russia current requirement is 300 million rubles which is equivalent to approximately 7 million euro. In Azerbaijan, another CIS country, this number is approximately 48 million euro. Apparently small and developing economies are tend to have more strict regulations in order to maintain macroeconomic stability which is much sensitive to changing conditions. Nevertheless, this tool is not widely used as a regulatory instrument in the countries with stronger banking industries such as UK, US and Western European countries. Initial capital requirement acts as the assurance for banking authorities that the newly established banks will be able to carry out the activities and functions in a minimum level. (Central Bank of Azerbaijan Republic 2012, Abdullaev 2011)

Prior to joining the Euro zone Estonia's monetary policy was fairly different from other classical monetary policy approaches. Thus, Estonia did not apply central bank interest rates as a tool to influence money supply in economy. Estonian monetary system was based on fixed exchange rate regime against the euro with currency board arrangement. Due to currency board arrangement the Bank of Estonia did not implement independent monetary policy, i.e. the money supply in Estonia was endogenously determined by money demand. Central Bank of Estonia was not involved in open market operation and did not influence money supply by selling bonds or by setting interest rates. Since Estonia's banking system is exclusively dominated by foreign investors, fixed exchange rate policy was quite effective in order to influence money supply flowing from other countries. This unique regulation cannot be applied widely because it constitutes particular characteristics of certain country's (Estonia) economy. (Taniloo 2013)

Being one of the regulatory bodies of financial system comprising Council of Financial Regulators (CFR), Australian Prudential Regulation Authority (APRA) is the key institution for bank supervision. APRA sets special regulation in order to identify risk and supervise certain financial institutions, including banks, to prevent possible serious consequences of future crises. APRA applies dualistic regulatory and supervisory system in order to maintain safe and sound banking activities. The first pillar of this system is Probability and Impact Rating System (PAIRS) which evaluates the riskiness of financial institutions. The second pillar is Supervisory Oversight and Response System (SOARS) defines further supervisory activities to be carried out to overcome these risks. According to PAIRS in order to determine the probability of failure banks are categorized into different groups by the riskiness of different classes such as board, management, liquidity, earnings, additional capital, total capital etc. These categories are summed up to overall risk of a financial institution and the final risk rate is calculated. Final step of PAIRS is to calculate possible consequences of the financial institution according to its risk. In the next step according to SOARS principles institutions are grouped in four different treatment classes for their PAIRS assessments. The supervisory activities to be implemented are defined by the institutions' belongings to these groups. Unlike private rating agencies' rating experience, which was questioned after latest crisis, APRA's dualistic system relying also on ratings is more trustworthy. Thus, it is stricter and does not represent private interests and therefore more accurate. (APRA 2012)

Although Basel Accords reduced the differences of regulation among countries, discrepancies in approach to bank supervision and macroeconomic stability regulation still exists. Therefore banks' performance and readiness to crises vary across countries according to the characteristics of supervision and control. However, this study does not cover very diverse countries for empirical tests. Hence, the results of the tests are expected not to be affected by discrepancies in regulation.

4. FINANCIAL CRISIS AND INTEGRATION OF MARKETS

Although six years have passed since the first signs of the worst global financial crisis after great depression many countries still suffer from imbalances it has caused. Therefore, it is still interesting and debatable topic for scholars to discuss the factors that caused the crisis. All points of views of scholars come to agreement in one point that the crisis was originated from US real estate market which was closely tied to financial sector through various channels. Since the US economy is entwined with other developed economies of the world very tight, the crisis stroke many countries as well. As the result of economic integration and globalization of world economy the crisis has shocked developing countries in its further stages. The main purpose of this chapter is to discuss major factors that triggered the crisis and the reasons why it has spread globally.

4.1. Conditions before the crisis and its occurrence

As the epicenter of the crisis, economic and social conditions in US have started and triggered its further development. Traditionally US people are prone to have their own homes. Home ownership is considered as the start of independent personal life of US young people. Although most of the families contribute in buying new residence for their children, it is still not enough to cover the whole amount. Therefore, there is always high demand to housing loans in the United States. By knowing this attitude of people US banks were willing to increase their returns with more mortgage loans when the interest rates were really low in the beginning of 2000s. Undoubtedly, US government was also aware of this attitude of their people and they were trying to stimulate the economy by cutting of interest rates and hence prospering real estate market.

Merrouche and Nier (2010) argue that the main factor that triggered the crisis was the loose monetary policy of US government for relatively long time period. Low interest rates let the banks take more risks and issue more loans; they lead the banks to borrow more in order to finance the growing demands for loans; and finally lead the prices of real estate rise as it was reachable by many people under these conditions. Interest rates were fluctuating around 1% in early 2000s (BBC News 2009), which made the mortgage lending more attractive.

Merrouche and Nier (2010) further argue that disproportions in global economy were another reason to trigger the crisis. This argument is also supported by Lin and Treichel (2012), where they state that the attitude of fast growing economies like, Russia, China, Brazil, India and Southeastern Asian countries, to support their economies by increasing export led to high amount of capital inflows to those countries. High capital inflows increased the credit supply and reduced the interest rates in those economies. Therefore, banks of these countries were also willing to increase their profits by increasing their leverage under those competition conditions.

While discussing the main reasons of the crisis, Taylor (2009) states loose monetary policy of Fed as the major contributor. Apparently, Fed had violated the Taylor rule, which defines Fed's interest rate policy in response to changing economic and monetary conditions in economy. Taylor (2009) states that very low Fed interest rate, about 1%, was the major contributor of extremely large cash inflows to the US economy. Very sharp rise of interest rates right after 2004 led to default of many borrowers whose loans were tied to floating rates. Although discussions about Fed's attitude towards interest rates are not important in this paper, it is worth to highlight its main reason.

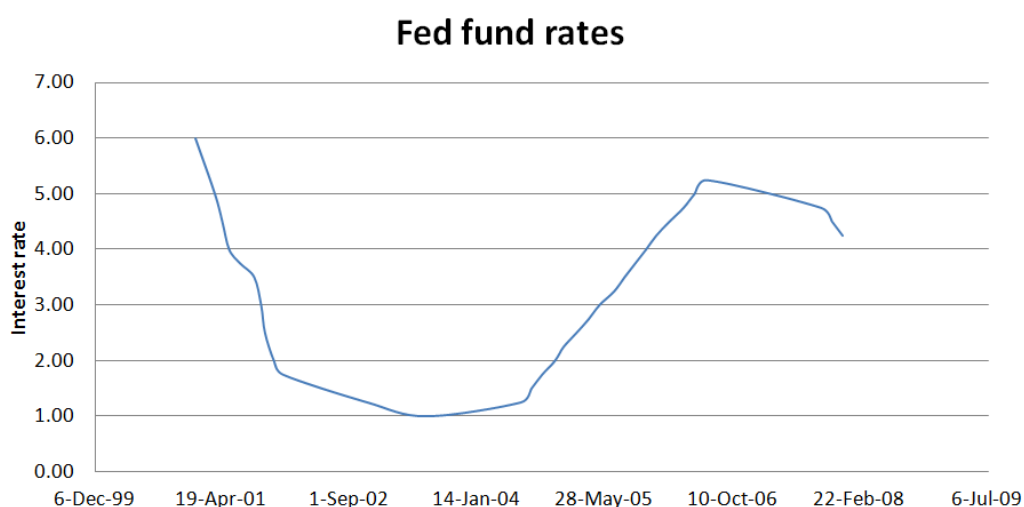


Figure 9. Federal Reserve interest rates 2001-2007.

Figure 9 shows how sharply interest rates were falling until 2004. This happened mainly in order to support US war in Afghanistan and Iraq. US government believed that they can support national military industry and other industries related to it by lowering

interest rates. Apparently this policy was efficient for some 3-4 years as Figure 9 shows. Thus, the government have understood the existence of very large proportions of money supply in economy and decided to increase the interest rates. Of course it has stopped the flow of money to economy, but it also worsened the repayment capabilities of lower class borrowers.

In order to understand how mortgage lending in US caused the worst crisis after Great Depression, one first needs to understand how the actions carried out by financial institutions related to mortgage lending look like. Before explaining the process the terms MBS, CDO, CDS and SPV should be defined. Mortgage backed security (MBS) is issued by a financial institutions backed by mortgages, which are sold to another financial institution in exchange for cash. They can be classified by the quality of the customers included, from high rated to low rated MBS. Collateralized debt obligations (CDO) are formed by pooling MBS and other asset backed securities in order to form new security; they are also rated from low risk to high risk groups. Credit default swap (CDS) is a contract where seller takes the responsibility to pay the principal of a loan to buyer in the case of the loan's default. Special purpose vehicle (SPV) or special purpose entity is established to carry out projects that need special effort and management in order to detach risk from main company. In this model SPVs are involved in issuing CDOs for investment banks.

Different mortgage banks, mortgage loan officers and the mortgage customers form the first stage of the model. As interest rates fall, banks want to make more profit by increasing their portfolios. Since most of the customers with good credit history already have mortgages banks are interested to issue mortgages to so called sub-prime customers who have bad credit history or do not have it at all. In order to meet the high demand to mortgage loans banks hire a lot of new mortgage loan officers who are paid basically for their performance, i.e. the more they have portfolio the more they are paid. In most cases this attitude leaves the quality of customer to the second priority and leads to misinforming the bank and fraud. Of course due in the loans reduce their premiums. However, most of sub-prime customers are able to repay the loans in early periods; therefore those loan officers do not face major changes in their premiums.

Participants of the second stage of the model are mortgage issuing banks, investment banks, rating agencies and SPVs. In this stage mortgage issuing banks pool up the mortgages in order to form MBS for further fund raising. MBS are formed from customers with different repayment capabilities and therefore are rated differently. The holders of high rated MBS get their payments first, and the low rated MBSs last.

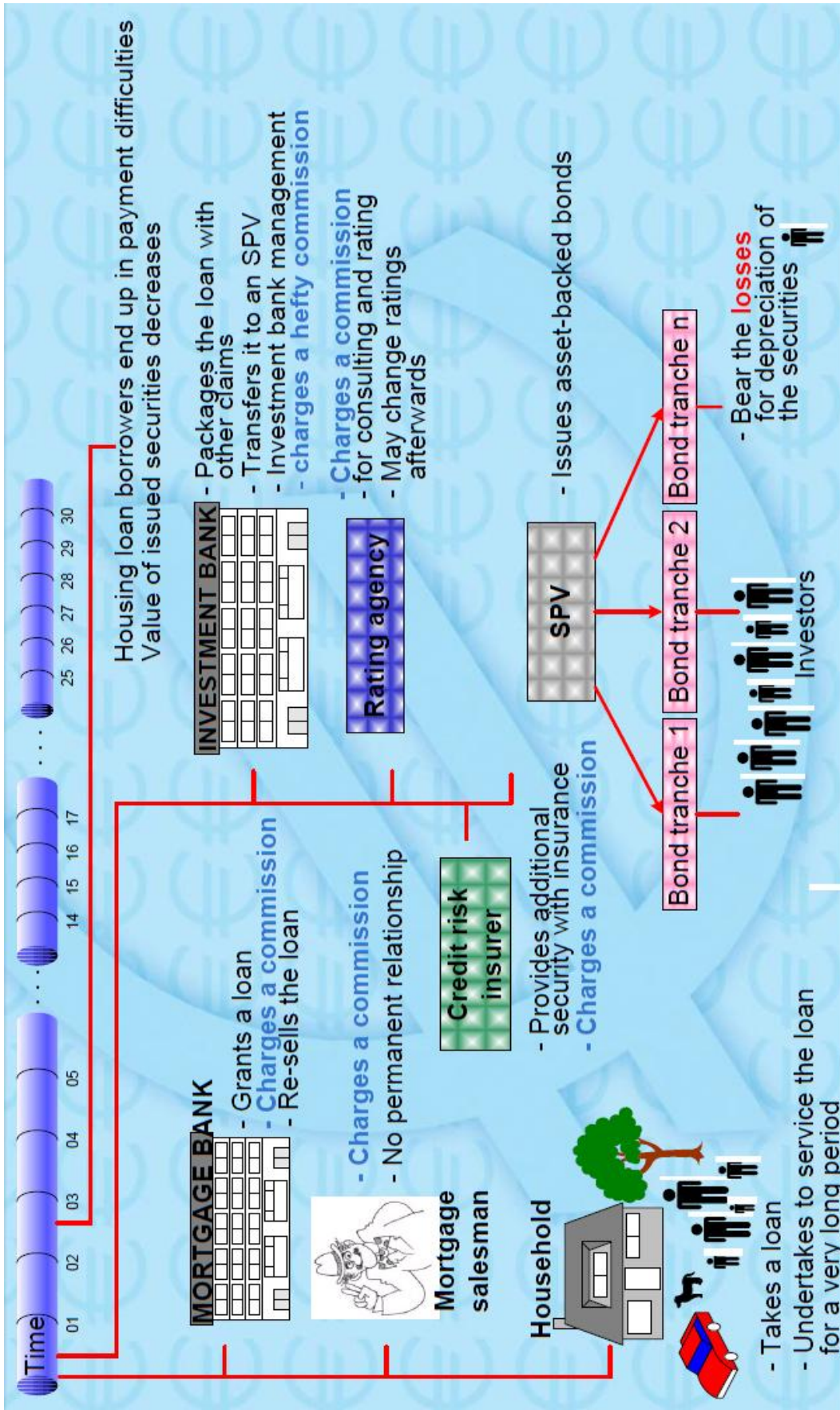


Figure 10. The process related to mortgage lending and its consequences (Toivanen 2013).

However, low rated MBS promise high returns, which make them attractive for investors. These MBS are sold to investment banks that transfer them to SPVs in order to form new securities-CDO. Together with other asset backed securities possessed by investment banks MBS are pooled and CDOs are formed with new risk groups. Another investment bank includes these CDOs in new pool of securities in order to create new CDO which increases the risk significantly. The riskiness of these securities is defined by reliable rating agencies thereafter. However, apparently these ratings were not that reliable mainly because of the complexity and sometimes inability of the measuring the risk. The investment banks buy CDS in order to offset their risks against defaults. Therefore, other financial institutions which issue CDS were also involved in this chain.

When Fed interest rates start rising, as it happened in 2004, floating rates of mortgages also rise; as a result most of the sub-prime borrowers face difficulties in repayment of their loans. Therefore, the holders of low rated securities might not get their premiums. Consequently defaults in mortgages affect all participants in this chain. But how the failures in this trivial proportion of US financial assets lead to catastrophic results for the whole world? Eichengreen, Mody, Nedeljkovic and Sarno (2009) state that at the time of crisis total amount of US mortgages was equal to 3% of US financial assets. They argue that financial institutions in US tend to show similar behaviors to changing conditions. As a result, rising interest rates after 2004 worsened their capabilities to borrow and refinance. Since most of big investment banks were involved in investing to CDOs and MBS, the failure of the system affected all of the actors. According to Diamond and Rajan (2009) the mass failure of these securities dropped their price significantly, and even short-term lending became difficult for banks. Further, the loss of trust to banks by people and by other banks as well caused harsh bank runs and even suspension of interbank lending. Interbank lending restored after intervention of central banks and ministries of finance but the rates became significantly high. First attempts to save the economy did not give any important returns. As a result the crisis widened in a short time and went global in further years.

4.2. Further development of the crisis and its consequences

The first signs of crisis were observed when New Century Financial, sub-prime mortgage issuer, reduced its employees to half under US bankruptcy legislation and Bear Stearns released tensed information for its investors in April, 2007. Further BNP

Paribas releases the information about the concerns of the liquidity of some of its funds. Although most of the Northern Rock's mortgages were financed by market operations released information and uncertainties of markets lead to the bank run in this company. Ultimately, the UK government had to intervene in order to decrease bank run in Northern Rock. Later in October of the same year UBS, a Swiss bank, and Citigroup revealed billions of losses in their sub-prime activities. These developments promised no more positive change for the deepening crisis. Hence, in the beginning of 2008 Bear Stearns, an investment bank, bankrupted and was bought by JPMorgan Chase for only \$ 10 per share, whereas the price per share was fluctuating around \$ 130 before the crisis.

As most of the scholars and financial experts agree Lehman Brothers bankruptcy was the triggering event which led the crisis last longer and spread around the globe. Lehman Brothers was involved mainly in investing in asset backed securities like CDOs. Therefore current conditions in the market affected it much. The company was highly levered and faced difficulties when the asset price boom ended in US simultaneously with the rising number of defaults in mortgage loans. As a highly levered company with CDOs the process affected it significantly and the company had to announce its bankruptcy in September 2008. Although the US government carried out bailout plans to liquidate financial markets they did not saved Lehman Brothers from bankruptcy. This event led the distrust among financial market participants and the rise of LIBOR rates. Bartram and Bodnar (2009) show that the volatility in markets raised up to 70% right after the failure of Lehman Brothers. The number explains the rate of distress and uncertainty in financial markets. Following the default of Lehman Brothers equity market indices fell about 50% compared to their 2006 year end rates. Reaction of the stock indices was also similar: Dow Jones dropped as much as it fell after September 11 attacks. Consequently Barclays Plc acquired the trading assets and liabilities, and headquarters of Lehman Brothers when the negotiations on acquisition between them failed. Japanese Nomura Holding acquired its European and Middle Eastern equities and investment operations. (Eichengreen et al. 2009, Bartram and Bodnar 2009)

As the crisis was spreading through economies, governments were carrying out new rescue plans for financial sectors and for the whole economy as well. Although there were several attempts to overcome and slow the crisis along with bankruptcy of Lehman Brothers, several factors caused its expansion further. Following the collapse of Lehman Brothers the US government passed a bill called Emergency Economic Stabilization Act (EESA) in October of 2008, which formally allowed them to carry out stabilization activities of Troubled Asset Relief Program (TARP). According to TARP the US

Congress authorized the use of \$ 700 billion in order to stabilize worsened economic conditions and prevent further spread of the crisis. However the revised amount of the aid to economy was reduced to 475 billion by Dodd-Frank act of 2010. (US Department of the Treasury 2013) Initially TARP authorized the US government to finance problematic assets in the amount of \$ 700 billion. Under EESA problematic assets are the assets which fall under these criteria:

- Residential and commercial mortgages and securities related to them,
- Other financial instruments which are agreed with Fed and US Congress.

TARP allowed the US Treasury to purchase illiquid assets and shares of financial institutions in order to recover the activity of financial markets and restore pre-crisis trading in the markets. The program aimed to stimulate market trading of securities and increase their price in order to get their values back to pre-crisis terms. Moreover, TARP targeted to restore the trustworthiness among banks which was lost during the crisis and attracted on LIBOR rates. It aimed to decrease the LIBOR rates and consequently increase inter-bank lending and lending to the economy. Financial institutions participating in TARP are obliged to buy their assets and/or equity back when the liquidity is restored. Apparently the program reached its goals in preventing the spread and lasting of the crisis more. As of July 2013 95% of the spending financed by the program is paid back: from \$ 420 billion of allocated funds \$ 400.5 billion returned. (US Department of the Treasury 2013)

Loose credit regulations in US economy affected not only its own economy but also other countries, mainly European ones. As a result of economic imbalances in the United States many weak countries faced crucial problems with financing in their economies. Undoubtedly one of the major crises in European countries happened in Iceland which led to fail its banking system and government bailout of all three major commercial banks in the country. Icelandic banks were enjoying excess flow of capital from US and Europe in the beginning of 2000s. Therefore, they were highly dependent on foreign financing. However in domestic economy banks were lending in national currency, Icelandic Kron (ISK). This attitude increased exchange rate risks for all three major Icelandic banks significantly. Hence, when the Icelandic currency depreciated in value, the repayments by national customers who borrowed from banks in ISK were not able to cover the banks' debts to foreign financiers. In essence the Icelandic economy borrowed too much from international financial institutions compared to its GDP and changing economic conditions triggered its failure as well. Consequently the

government of Iceland took over these banks and the problem was solved by government guarantee over these banks' debts.

As a major economic partner of US, European Union was affected by the imbalances in US economy as severely as the United States. Peter Praet, Member of the Executive Board of ECB, names two main reasons of the crisis in Eurozone originating from the United States. Firstly, US mortgage market created too complicated securities which were trading throughout the world. Secondly, collapse of Lehman Brothers froze trading among financial institutions and led to distrust and uncertainty between them. European banks were enjoying high inflow of capital from US during loose economic terms and they were involved in the operations with complicated securities as well. Mainly these two factors swayed inappropriate debt policies of EU states and lead to sovereign debt crisis in Euro Area. (Praet 2013)

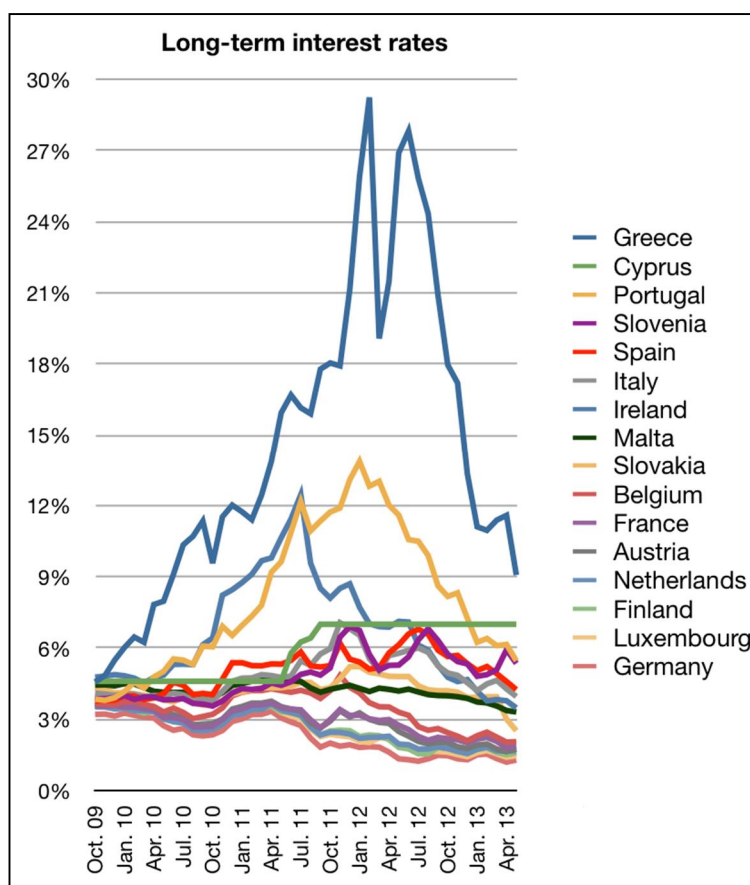


Figure 11. Long-term interest rates in some EU countries (Source: ECB)

Anxiety and uncertainty in some countries with extremely high debts led to the increase in interest rates for the debts which were financed from foreign financiers. The cutting of riskiness ratings by international rating agencies also triggered the process. As a result highly levered countries of EU such as Greece, Cyprus, Italy, Spain, Portugal and Ireland had to apply strict budget policies which in turn led social tensions in these countries. Figure 11 shows how interest rates for long term governments change across countries. Apparently, Greece was the most risky country with extremely high yields.

In order to prevent the crisis European Central Bank carried out important anti-crisis acts. European Financial Stability Facility and European Stability Mechanism were established to help the EU members suffering from sovereign debt problems. These two organizations are aimed to provide easy funding to EU states during crises when rising interest rates limit their ability to borrow. Along with these establishments European Central Bank introduced Long Term Refinancing Operations in order to increase liquidity of money markets. Previously ECB was offering short-term financing which was costly during crisis times. These programs and the actions carried out in national level by governments improved the situation in EU pulled the tensions down.

To conclude, this crisis was the worst crisis after Great Depression. Immediate responses by US and other leading economies prevented it to spread too deep in economies. Developing countries became locomotives of the World economy after this crisis. While most of the developed countries were experiencing sharp falls in GDP, developing countries were still growing during these times. This crisis revealed imbalances in world economy and also deep integration among capitalist countries. Therefore, it is interesting to analyze how the economies of different countries are integrated with each other. The next section investigates major points from integration and correlation of economies.

4.3. Integration of economies

In order to measure how different economies are integrated with each other scholars mainly investigated the movements of their stock markets. These movements are tested through the level of their correlation. Another measure of economic integration is tested through the reaction of equity markets and other important markets in one country to the macroeconomic news announcements in another country. This section summarizes main findings in integration of economies and their co-movements.

Intuitively it might be claimed that there is a correlation between different markets because otherwise investors can gain by arbitrage opportunities across different countries. Although integration is weak among some economies, most of the studies show that markets are correlated and deeply integrated among several countries. Solnik, Boucrelle and Le Fur (1996) show that correlation of economies of Switzerland, UK, Japan, France and Germany with US have increased significantly over 37 years. They explain it with economic policies applied in these countries. They also state that due to the cooperation through EU the economies of France and Germany integrated and highly correlated. Their findings also show that when volatility increases correlation among these economies also increase. This finding lets us to claim that rising financial imbalances in one of these countries may alter stocks and therefore economy in other countries.

Before Solnik et al. (1996), King, Sentana and Wadhvani (1994) find that there is no integration among stock markets of different countries; therefore investors can gain by diversification. However they do not reject the existence of integration among economies. Unlike King et al. (1994) Longin and Solnik (2001) find correlation in stocks in “bull’s markets.” They find out that as the returns become extremely low correlations between stocks increase. This finding is interesting in order to explain high stock losses during economic recessions and crises.

Correlation of the stock markets of developed countries with US stock markets rose significantly from 1980s to 1990s. These changes might be explained firstly by the attitudes of investors. Thus, an American investor is not only playing in a local scale, but they invest also in the stocks of other countries. This attitude is also true for a German, Dutch, English investor as well. Therefore, the interests are co-integrated and market movements show similar patterns. Another reason of the rising correlation is global diversification in financing and production. If we take into account the number of multinational companies operating in different countries and therefore deeply integrated to economies it can be claimed that they can cause the stocks move together. Despite all the developments these changes in correlations can be a temporary process related to rapid growth of stock markets. (Brooks and Del Negro 2004) Figure 12 demonstrates changes in correlation coefficients between US stock markets and the stock markets of several countries.

Studies show that correlation among stock markets do not stay still all time, they change and react to changing economic and other conditions. Erb, Harvey and Viskanta (1994) find that even during rising globalization and economic integration period correlation

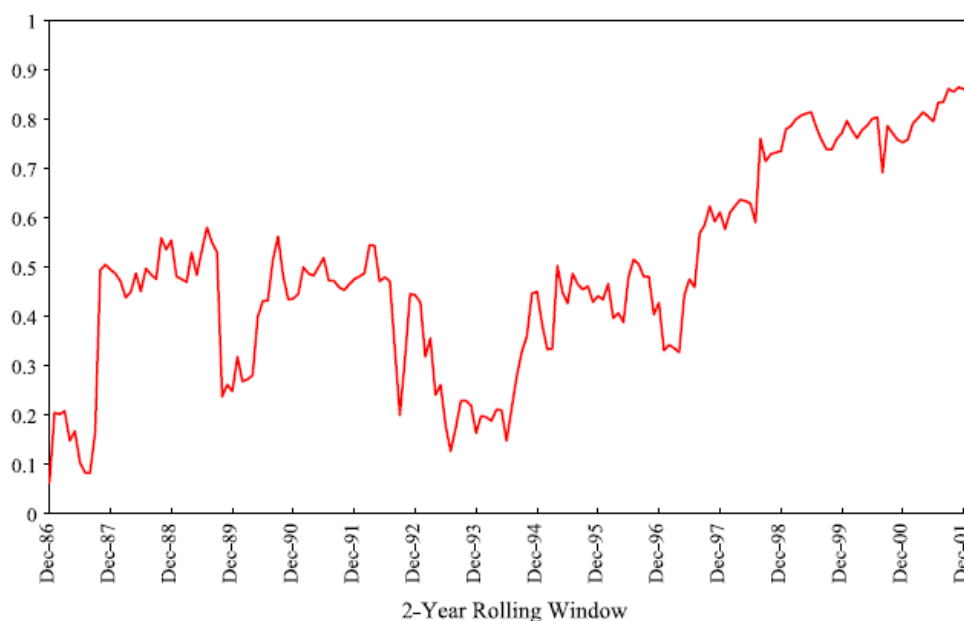


Figure 12. Correlation coefficients of stock markets (Source: Brooks and Del Negro 2004)

among countries can decline. Their findings reveal that economic recessions happening at the same time in different countries increase the correlation between stock markets. This finding is similar to Longin and Solnik's (2001) finding, and can affirm that bad economic conditions in one country can affect other country's economy significantly. On the other hand economies are less correlated during good times. Apparently, markets are more concerned about bad times than good times.

Findings of the paper by Graham, Kiviaho and Nikkinen (2012) is interesting in terms of explaining co-integration of US stock markets with emerging countries' stock markets. Mainly they find co-movement of markets of these countries in the long-term. However, there are no strong relations of the markets for short time period. This finding is important to explain why developed countries were affected first and much by the crisis. As the crisis lasted longer in developed countries it affected emerging markets as well. However, it did not stop their economic growth unlike in developed countries. Apparently, less integration and willingness to develop their economies independently let the emerging countries to prevent extreme results of the crisis.

Reaction of markets in one country to the release of macroeconomic news in another one can also explain much about integration of economies. For instance, German government bonds are sensitive to US macroeconomic news. This can be explained by the role of US in global economy and its being a financial center of the World. It can be also explained by deep integration of US companies to Europe and specifically to Germany in this case. In both cases obviously US macroeconomic news has impact on German bonds. (Andersson, Overby, Sebestyen 2009) Of course these findings can explain movements of German and other European markets in response to US anti-crisis actions. Thus, emission of big amount of dollars in order to carry out bailout plans in US can be perceived as inflation risk in Germany. Moreover, increase in Initial Jobless Claims in US can cause German bonds depreciate in value. These behaviors of markets also explain why the crisis originating from US can raise economic and social tensions in Europe.

The purpose of this section was to find enough evidence from studies by different scholars in order to prove the existence of co-movements of markets of different countries. As it can be observed there are correlations among markets in many countries and they are high in some specific countries. Moreover, most studies reveal that correlations increase during economic recessions or shocks such as crises. Therefore the question “Why a crisis happening in the United States caused similar bad results in Europe?” can be answered by these findings with confidence. It is worth to mention that the economies of developed countries are too integrated that rising tensions and shocks should not be considered as internal affairs of one country. Therefore, further steps to eliminate the results of latest crisis and prevent future crises must be carried out by the contributions of all developed countries. Obviously as the locomotives of global growth during latest crisis, large emerging markets should also act along with these countries.

5. DATA AND METHODOLOGY

This chapter clarifies the data, methodology and variables' explanation for the empirical tests of the study. First section provides comprehensive explanation of the variables used for econometric models. The second section of the chapter illustrates sources of data used for the study and their collection method. Moreover, it explains the data and provides descriptive statistics about it. Applied methodology for the empirical tests and description of econometric models are explained in the last section of the chapter. Detailed description of the applied methodology refers to the textbook by Wooldridge (2008) and Gujarati (2004).

5.1. Explanation of variables

Like other financial and non-financial firms in the economy, banks are affected by macroeconomic and microeconomic factors. Therefore, it is important to explain these factors separately in order to draw a clear image of these determinants. Since one of the main goals of this study is to find the impact of the crisis on banks' capital structure, dependent variable for econometric tests for the first and third hypotheses is chosen the ratio of Equity to Total Assets. Since the data source was not able to provide sufficient amount of observations for other capital ratios, Equity/Total Assets ratio is used. In order to identify the impact of the crisis to short-term and long-term liabilities of banks two ratios are chosen as dependent variables, ratio of Deposits and Short-term funding to Total Assets and the ratio of Long-term funding to Total Assets. Dependent variable for the last hypothesis is the percentage change of capital structure measured by Equity/Total Assets.

Independent variables: Bank specific factors. Although, there are many bank specific factors affecting banks' capital structure choice, the most important and interesting ones are chosen for this study. These include:

Total Assets: This variable is important in order to determine the impact of bank size to capital structure choice. While banks grow they tend to increase their leverage and issue more loans in order to increase their revenues and the variety of operations. This variable measures if bank size factor has shown different patterns around the latest financial crisis.

Net Income, Net Interest Revenue, Non-interest Income. When banks observe their revenues increase over time they believe that their capital structure policy is efficient and they are willing to support it by attracting more sources of funding in order to maintain the growth of their income. It is also important to distinguish interest income and non-interest income in order to make conclusion which of these have been affecting banks during financial crisis. Interest income is important for the banks which rely mainly on classical banking, i.e. issuing loans, while non-interest income is important for non-classical and large banks, which apply innovative banking activities. Therefore, these variables will let to make conclusions about these two different types of banks.

Ratio of Loan Loss Reserves to Gross Loans. This variable is also important in order to observe the impact of the crisis to the quality of issued loans. It is expected that this ratio will show significant impact on capital structure not only during the crisis but also the subsequent period. Since the loan losses are not covered in a short time, this variable is expected to have longer impact.

Ratio of Customer Deposits to Total Assets, Ratio of Deposits from Banks to Total Assets. Obviously during the crisis times banks usually lose their trustworthiness. This happens not only because of their performance but also customers' expectations. Therefore, during crises deposits by customers decrease significantly and might lead to illiquidity of banks and ultimately to failure. Moreover, recent crisis also altered trust ties among banks themselves. Thus, interbank lending rate increased considerably and also was suspended for some period during the crisis. Accordingly, these two variables are expected to have significant impact on banks' capital structure during crisis.

Return on Average Assets (ROAA) and Return on Average Equity (ROAE). These two measures of bank profitability are included in the model in order to measure the impact of crisis on banks' capital structure. These variables along with GDP growth are proxies for the financial crisis.

Independent variables: Macroeconomic factors. Main macroeconomic factors affecting bank capital structure choice and other crucial decisions are Central Banks' interest rates and Minimum Reserve Requirements. Along with these two variables GDP growth rate for countries are also included as the proxy for financial crisis. GDP growth rate, ROAA and ROAE are most important variables throughout this study in order to define the impact of crisis to bank capital structure. Finally, Government Effectiveness indicator is included in the econometric models in order to measure how policies carried out by government affect bank capital structure choice. Intuitively, good governance must lead effective power of bank regulation and sound banking system which should

influence banks' capital structure in turn. Table 1 summarizes all dependent and independent variables and provides brief description of them.

Table 1. Summary of dependent and independent variables.

Variables	Description
Dependent variables	
E/TA	Ratio of Equity to Total Assets
STL / TA	Ratio of Deposits and Short-term liabilities to Total Assets
LTL / TA	Ratio of Long-term liabilities to Total Assets
Independent variables	
<i>Macroeconomic factors</i>	
GDP growth rate	This variable is used as a proxy for crisis
MRR	Minimum reserve requirements by Central Banks
Interest rates	Interest rate of Central Banks
Government Effectiveness	Measure of effectiveness of national governments
<i>Bank specific factors</i>	
Total Assets	Proxy for bank size
Net Income	Bank income measure
Net Interest Revenue	Bank income measure
Non-interest Income	Bank income measure
Loan loss Reserves/Gross Loans	Proxy for bad performance
Customer Deposits/TA	Weight of Customer deposits
Bank Deposits/TA	Weight of Bank deposits
ROAA	Proxy for crisis along with ROAE and GDP
ROAE	Proxy for crisis along with ROAA and GDP

5.2. Data description

The data used for this study is mainly from Bankscope which is provided by Bureau Van Dijk. Bankscope database contains very diverse information about banks' assets and liabilities, income statements, financial ratios, ratings, specialization, ownership, stock data and so forth for 30,000 banks worldwide. Information about banks' total assets, equity/total assets ratio, income measures, loan loss reserves, customer and bank deposits, mortgage loans and profitability measures: ROAA, ROAE, are obtained from Bankscope. Non-interest income is calculated as the sum of followings: other operating income, net gains (losses) on trading derivatives, net fees and commissions, remaining operating income. Since Bancscope contains very diverse financial firms, obtained data was checked and central banks, government bank institutions for certain purpose, multilateral banks formed by many countries and other regulatory financial institutions were excluded from the final sample. As a result the sample includes commercial, saving, real estate and mortgage banks, bank holding and holding companies, cooperative banks, micro financing institutions, Islamic banks, investment banks, private banking and asset management companies, group finance companies and investment and trust corporations. Table 2 illustrates the number of certain bank types and total number of individual banks for the whole sample.

Macroeconomic data information has been obtained from different data sources. Firstly, GDP growth rates by countries were obtained from World Bank database. This information is based on annual percentage growth rate of GDP at market prices based on local currency of each country. Interest rates of central banks of the following countries were obtained from DeltaStock database: Switzerland, Norway, Eurozone, Cyprus, Czech Republic, Denmark, Hungary, Poland, Romania, Sweden. DeltaStock is an authorized online FOREX and CFD broker regulated under MiFID (EU Directive 2004/39/EC). Information about other countries' interest rates was obtained either from the corresponding country's central bank's website or from annual reports of central banks. Information about minimum reserve requirements was obtained from each country's central bank's website or annual reports. MRR information about the countries which joined Eurozone in later periods of sample was obtained from the archives of their central banks. US have the system of minimum reserve requirements with certain thresholds. Thus, to calculate minimum amount of reserves banks subtract the deductible amounts from low-reserve tranche and hold 3% of this amount as reserves in Federal Reserve Banks. If the amount is more than low-reserve tranche then a bank must hold 10% of the amount exceeding 3% threshold as reserves. In order to calculate the reserve requirements in terms of percentages the amounts to be hold by 3%

Table 2. Information about number of banks and their types.

Countries	Commercial Banks	RE&M Banks	Savings Banks	Other Banks	%RE&M Banks	Total
Austria	71	17	97	137	5.28%	322
Belgium	31	2	6	31	2.86%	70
Cyprus	17	0	1	14	0.00%	32
Cz. Republic	19	2	0	5	7.69%	26
Denmark	41	9	40	13	8.74%	103
Estonia	7	0	0	3	0.00%	10
Finland	9	4	2	5	20.00%	20
France	122	27	27	133	8.74%	309
Germany	127	42	429	1061	2.53%	1659
Greece	12	0	0	4	0.00%	16
Hungary	28	4	0	4	11.11%	36
Iceland	7	2	10	6	8.00%	25
Ireland	14	6	0	28	12.50%	48
Italy	98	3	39	483	0.48%	623
Latvia	22	0	0	0	0.00%	22
Lithuania	11	0	0	0	0.00%	11
Luxembourg	70	1	2	32	0.95%	105
Malta	9	0	1	7	0.00%	17
Netherlands	32	7	1	32	9.72%	72
Norway	14	9	117	9	6.04%	149
Poland	45	0	1	7	0.00%	53
Portugal	25	1	4	16	2.17%	46
Romania	26	0	2	2	0.00%	30
Slovakia	13	2	2	2	10.53%	19
Slovenia	17	0	2	3	0.00%	22
Spain	51	1	25	84	0.62%	161
Sweden	26	9	55	16	8.49%	106
Switzerland	133	4	198	86	0.95%	421
UK	137	53	2	205	13.35%	397
USA	677	23	382	915	1.15%	1997
Total	1911	228	1445	3343	3.29%	6927

levels are calculated for each year in terms of 1/1,000,000 USD and natural logarithms of these amounts are calculated thereafter. Table 3 illustrates these calculations (amounts are in million USD).

$$(3) \quad \text{Low-reserve tranche amount} = (\text{Low-tranche} - \text{Deductible}) \cdot 3\%$$

$$\text{MRR}_{\text{US}} = \ln(\text{Low-reserve tranche amount}/1,000,000)$$

Table 3. Low-reserve tranche amounts.

Effective date	Low-tranche	Deductible	Difference	3% of Differ.	Ln(3% of Differ.)
23 Dec 04	47.6	7	40.6	1.218	0.1972
22 Dec 05	48.3	7.8	40.5	1.215	0.1947
21 Dec 06	45.8	8.5	37.3	1.119	0.1124
20 Dec 07	43.9	9.3	34.6	1.038	0.0373
01 Jan 09	44.4	10.3	34.1	1.023	0.0227
31 Dec 09	55.2	10.7	44.5	1.335	0.2889
30 Dec 10	58.8	10.7	48.1	1.443	0.3667
29 Dec 11	71	11.5	59.5	1.785	0.5794
27 Dec 12	79.5	12.4	67.1	2.013	0.6996

Data for Government Effectiveness was obtained from World Bank's Worldwide Governance Indicators page. Worldwide Governance Indicators include six different indicators for governance of a country, including political and economic governance. These are Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption. Government Effectiveness is calculated based on the factors that affect efficient running of government policies.

In order to be able to make comparisons about the pre-crisis, during crisis and post crisis periods the whole data is divided into three sub periods. The first sub period contains the information for the years 2004-2006. The second sub period contains information for the years 2007-2009, which are considered the worst years of the crisis. Finally,

third sub period captures the years 2010-2012. Table 4 reports descriptive statistics for each sub period (Non-interest revenue and Net-interest income are in thousands).

Table 4. Descriptive statistics of variables for three sub periods.

Variables	Mean			Median			Std.D.		
	1	2	3	1	2	3	1	2	3
Equity/TA	11.29	11.38	11.59	7.72	7.81	8.35	13.69	15.27	16.36
Long-term/TA	0.11	0.12	0.09	0.05	0.05	0.03	0.16	0.18	0.15
Short-term/TA	0.76	0.75	0.77	0.83	0.84	0.85	0.20	0.21	0.20
Ln(TA)	13.85	14.05	14.15	13.57	13.76	13.86	1.98	2.04	2.04
Ln(Net Income)	8.67	8.50	8.55	8.41	8.19	8.23	2.25	2.21	2.23
Net Interest Rev	246	318	360	17.6	19.8	20.3	1547	2097	2417
Non-interest Inc.	576	599	769.6	15.2	15.8	17.9	3925	4909	6345
LLR/Gross Loans	1.83	2.18	2.95	1.15	1.39	1.83	3.60	3.28	4.53
Customer dep/TA	0.64	0.63	0.65	0.70	0.69	0.71	0.22	0.22	0.22
Bank dep/TA	0.16	0.16	0.15	0.12	0.11	0.10	0.17	0.18	0.16
ROAA	1.04	0.34	0.44	0.57	0.33	0.31	2.93	5.36	4.68
ROAE	9.10	3.98	2.90	7.08	4.66	4.10	15.58	26.86	27.41
GDP growth	2.74	-0.26	1.75	2.66	-0.08	1.80	1.31	3.20	1.54
MRR	1.83	1.80	1.71	2.00	2.00	2.00	1.97	2.07	1.34
Interest rate	2.24	3.07	1.41	1.88	3.44	1.25	1.81	1.53	0.93
Gov. Eff.	1.55	1.46	1.42	1.57	1.57	1.53	0.42	0.45	0.39

Analyzing performance measures show that average ROAA and ROAE have extremely dropped during crisis period. Although they have shown uptrend in post crisis period,

they still have not reached to pre crisis positions. Both, average bank deposits and customer deposits were not affected much by the crisis and stayed stable in post crisis period. It can be concluded that government interventions have been really useful and successful during crisis. The ratio of loan loss reserves have increased after crisis, which means that there have been significant amount of customers who failed during crisis. Consequently, this affected banks' worsening performance measures in post crisis period.

Macroeconomic indicators have worsened during crisis and they are still suffering from the consequences of it. GDP growth has fallen below zero during crisis for the countries included in sample. It has turned to positive after crisis but has not reached to pre crisis levels yet. Interest rates have risen and fallen sharply during crisis and after crisis respectively. This has been due to the immediate reaction to crisis and rapid intervention of governments to liven up the economies in post crisis period. Analysis of average measures let to conclude that banking industry has been suffered by the crisis significantly. However, immediate responses and acts to prevent crisis has avoided its further spreading and possible long lasting effect on economies.

5.3. Methodology description

The methodology applied in this study is fixed effects panel (unbalanced) estimation with OLS estimator for variable coefficients. According to the assumptions of fixed effects method there is always non-changing unexplained factor (a_i) for all cross-sections of panel data across time. Therefore, using fixed effects method eliminates these non –changing factors (a_i) and lets to get unbiased and reliable results for estimators. Obviously from the nature of fixed effects method it is impossible to use dummy variables in regression. Therefore, for this study it is stated that the fixed effects method will eliminate any country specific and bank type specific factors. Fixed effects method also assumes that slope coefficient for each cross-section is not changing through time. Accordingly, eliminating fixed effects across cross-sections also eliminates these slope coefficients (β_0). Simply fixed effects method takes the first difference of equations (4) and (5) in order to cancel unobserved effects (a_i).

$$(4) \quad y_{it} = \beta_1 \cdot x_{it} + a_i + u_{it}, \quad t = 1, 2, \dots T$$

$$(5) \quad \bar{y}_i = \beta_1 \cdot \bar{x}_i + a_i + \bar{u}_i$$

After taking the difference of these two equations a_i , which do not differ through time, will be eliminated. New model will look like as follows:

$$(6) \quad y_{it} - \bar{y}_i = \beta_1 \cdot (x_{it} - \bar{x}_i) + (u_{it} - \bar{u}_i)$$

or

$$(7) \quad \dot{y}_{it} = \beta_1 \cdot \dot{x}_{it} + \dot{u}_{it}$$

For this study it is also assumed that all error terms through cross-sections in different time periods are not correlated with one another, i.e. $\text{Cov} [\dot{u}_{it}, \dot{u}_{is} | \dot{X}_i, a_i] = 0$ for all $t \neq s$. Since some cross-sections do not contain full information for all variables the data used in this study is unbalanced panel data. The range of periods varies from 2004 to 2012. Full data occupies 62343 cross-sections for 9627 individual banks across countries.

In order to check the first hypothesis, how the crisis affected banks' capital structure generally the following regression has been run:

$$(8) \quad \text{Equity/Total Assets} = \beta_0 + \beta_1 \cdot (\text{Proxy for Crisis}) + \beta_2 \cdot (\text{Control Variables}) + u$$

where,

Equity/Total Assets is the ratio of banks' total equity to total assets,

Proxy for crisis is either GDP growth, ROAA or ROAE,

Control variables are the variables discussed in the first section of this chapter except the variables which belong to proxies for crisis.

GDP growth is the best indicator of crisis in macroeconomic terms. Therefore, it will measure how macroeconomic instabilities affected banks' capital structure choice. However, GDP growth can reflect the whole economy's impact on banks' capital choice. On the other hand more quick reaction to financial crisis derives from banks' previous performance. Therefore ROAA and ROAE are employed in this regression in order to support the results obtained from the regression with GDP growth. If they do not support the results of the regression with GDP growth then the latter is assumed to have best explanatory capacity.

The second hypothesis will be tested with the following two regression models:

$$(9) \quad \text{Deposits and Short-term funding /Total Assets} = \beta_0 + \beta_1 \cdot (\text{Proxy for Crisis}) + \beta_2 \cdot (\text{Control Variables}) + u$$

$$(10) \quad \text{Long-term funding/Total Assets} = \beta_0 + \beta_1 \cdot (\text{Proxy for Crisis}) + \beta_2 \cdot (\text{Control Variables}) + u$$

Since deposits are also considered as short-term liabilities for banks they are also included in the regression in order to test the dynamics of short-term liabilities around crisis. The explanatory variables are the same that used for the test of the first hypothesis. However, only the results from the regression with GDP growth will be reported. Hence, these results will best describe the dynamics of short-term and long – term liabilities.

In order to test the third hypothesis whether the Scandinavian countries performed better than others in this sample regression (8) is applied for Scandinavian countries and other countries separately. Scandinavian countries include Denmark, Norway, Sweden and Finland. Although Iceland is also considered as a Scandinavian country historically, for this test it is not included for the sample with others. This is because Iceland had a severe banking crisis during 2008-2011 and the country's banks have suffered much from this. Therefore, including Iceland to this sample may lead to biased results for the whole Scandinavian sample. Furthermore, the data with other countries do not cover US banks. The need for not including them in the sample arises from the fact that US banks suffered from the crisis first and worst. Moreover the results will be more consistent if the banks of the same economic and geographic region are compared to one another. Mainly for these reasons US banks are kept aside for the test of third hypothesis.

For first three regressions sample data is divided into three periods: 2004-2006, 2007-2009, and 2010-2012. The first period reflects the conditions and situation prior to the crisis. The second period will let to conclude about the dynamics during crisis. Finally, the last period will draw the image of banks for post-crisis period. Splitting the data into three sub periods allows to make conclusions whether the crisis affected bank capital and funding structure in different periods of economic cycle.

In order to test fourth hypothesis plain vanilla OLS regression has been applied for each year from 2007 to 2011 for every country separately. The following regression model has been employed for this test:

$$(11) \quad (L_{t+1} - L_t) / L_t = \beta_0 + \beta_1 \cdot ROAA_t + \beta_2 \cdot (\text{Control Variables}_t) + u_t$$

The dependent variable $(L_{t+1} - L_t) / L_t$ is the change in Equity / Total Assets ratio compared to previous year. All explanatory variables are observations for the current year. Goal of this regression is to discover the impact of ROAA to the changes in capital

structure by years. Since GDP growth is not changing within a year it cannot be used as proxy for crisis. Other macroeconomic variables are not included in the model as control variables as well.

Beta coefficients (standardized coefficients). Along with normal coefficients standardized coefficients will also be used in order to interpret the regression results. Therefore, it is important to briefly explain how the standardized coefficients of beta coefficients are obtained. Beta coefficients explain how a dependent variable is changed if one independent variable increases by one standard deviation, ceteris paribus. If it is assumed that all independent variables change at the same time, i.e. no ceteris paribus, then total effect of changes can be calculated with beta coefficients. In order to obtain beta coefficients the following steps are followed:

$$(12) \quad y_i = \hat{\beta}_0 + \hat{\beta}_1 \cdot x_{i1} + \hat{\beta}_2 \cdot x_{i2} + \dots + \hat{\beta}_k \cdot x_{ik} + \hat{u}_i$$

Take the average values by subtracting the means of dependent and independent variables and error term, average value of error term is zero.

$$(13) \quad y_i - \bar{y} = \hat{\beta}_1 \cdot (x_{i1} - \bar{x}_1) + \hat{\beta}_2 \cdot (x_{i2} - \bar{x}_2) + \dots + \hat{\beta}_k \cdot (x_{ik} - \bar{x}_k) + \hat{u}_i$$

By dividing each side of the equation with the standard deviation of dependent variable and then for each independent variable multiplying and dividing with their corresponding standard deviation we obtain new beta coefficients:

$$(14) \quad \frac{y_i - \bar{y}}{\hat{\sigma}_y} = \frac{\hat{\sigma}_{x_1}}{\hat{\sigma}_y} \hat{\beta}_1 \cdot (x_{i1} - \bar{x}_1) + \frac{\hat{\sigma}_{x_2}}{\hat{\sigma}_y} \hat{\beta}_2 \cdot (x_{i2} - \bar{x}_2) + \dots + \frac{\hat{\sigma}_{x_k}}{\hat{\sigma}_y} \hat{\beta}_k \cdot (x_{ik} - \bar{x}_k) + \frac{\hat{u}_i}{\hat{\sigma}_y}$$

The term $(\frac{\hat{\sigma}_{x_k}}{\hat{\sigma}_y}) \cdot \hat{\beta}_k$ explains how the dependent variable changes when the independent variable x_k increases by one standard deviation.

The results of all abovementioned regressions are reported in the next chapter.

6. EMPIRICAL RESULTS

This chapter summarizes the results and interpretations of the empirical tests. The first section of the chapter illustrates the interpretation of empirical test of the first hypothesis. The second section explains empirical results of the tests with the short-term and long-term funding around the crisis. Finally, the last section illustrates the comparison of bank capital structure dynamics in Scandinavian and other European countries.

6.1. Dynamics of the capital structure

Table 5 reports the results of the regression model described in formula (8) for the whole sample. Results reported in the first three columns represent the output with the GDP growth as the proxy for financial crisis. Results in the next three and last three columns represent outputs from regressions with ROAA and ROAE as proxies for crisis respectively. The bottom part of the table provides information about the observations for total unbalanced panels and results of the F-statistic for the whole model. Basically, the table reports how different factors affected bank capital structure around crisis with main focus on GDP growth, ROAA and ROAE.

First of all, it is important to pay attention to $\ln(\text{TA})$ variable. This variable reports how bank's size might affect its capital structure. In order to prevent unbiased results and maintain normal distribution natural logarithm of Total Assets is taken instead of using Total Assets. The results from all regressions report that $\ln(\text{TA})$ has a negative impact on bank capital structure. If asset growth is maintained by attracting more deposits and other funding sources negative effect of this variable is understandable. Hence, rising weight of liabilities in bank's balance sheet will lead capital ratio to decrease. Moreover, it can also be concluded that the larger a bank is the lower its capital ratio. Although their sample occupies only US banks, this finding contradicts to Berger et al. (2008) findings about capital ratios in large US BHCs. However, the findings are consistent with Cebenoyan and Strahan (2004) findings about BHCs.

The second coefficient $\ln(\text{Net Income})$ is also statistically significant for most of the regressions. By observing the dynamics of the coefficients through three periods it can be seen that they have declined very sharply during other two periods compared to

Table 5. Results of the regression model presented in equation (8) for the whole sample.

<i>Dependent variable</i>	<i>Equity/Total Assets</i>				<i>ROAA</i>				<i>ROAE</i>			
	04-06	07-09	10-12	04-06	07-09	10-12	04-06	07-09	10-12	04-06	07-09	10-12
<i>Proxy for crisis</i>												
<i>Sub periods</i>	<i>GDP</i>				<i>ROAA</i>				<i>ROAE</i>			
	04-06	07-09	10-12	04-06	07-09	10-12	04-06	07-09	10-12	04-06	07-09	10-12
<i>Independent variables</i>												
Ln(TA)	-5.7463***	-6.3262***	-5.9169***	-4.6092***	-6.1630***	-4.8643***	-5.1959***	-6.3695***	-4.9267***			
Ln(NetIncome)	1.1876***	0.4810***	0.2489**	0.5967	0.3575**	0.0232	1.2947***	0.6149***	0.3497***			
LLR/Gross Loans	0.2795*	0.1579	-0.0741	0.2832*	0.1727	-0.0609	0.2626	0.1540	-0.0476			
Customer dep/TA	-11.0150*	-9.4986***	-16.0562**	-11.0695**	-8.9843***	-15.4517*	-11.7610**	-9.6053***	-15.87**			
Bank dep/TA	-7.2149	-6.0876**	-13.809***	-6.6227	-5.6674**	-13.302***	-7.4710	-6.1906***	-13.56***			
Non-interest Inc	0.0000***	0.0000	0.0000	0.0000**	0.0000	0.0000	0.0000**	0.0000	0.0000			
Net Interest Inc	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			
ROAA				0.6496**	0.2198	0.6451**						
ROAE							-0.0058*	-0.0254	-0.0204			
GDP Growth	0.3408***	-0.0037	-0.3413***									
MRR	0.2423	-0.1557	0.7031*	0.3270	-0.1740	-0.0217	0.3362	-0.1340	-0.0600			
Interest Rate	-0.0916	-0.3753***	-1.5322***	0.0304	-0.3885***	-1.0683**	0.0308	-0.3671***	-0.9349*			
Gov. Eff.	0.1308	-0.9634*	1.7836	-0.0212	-0.9262*	-0.4222	0.0101	-0.8967	0.0362			
Constant	84.9431***	105.4137***	103.5058***	74.2817***	103.6747***	92.5575***	77.4574***	104.9542***	90.6261***			
Observations	2251	3542	5253	2251	3542	5253	2251	3542	5253			
F-statistic	45.3193	60.5712	42.8859	45.8656	61.4630	40.9959	44.3347	61.0837	40.4099			
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			

* Significant in 10% level

** Significant in 5% level

*** Significant in 1% level

2004-2006. Since net income is a measure of profitability, the coefficients of this variable lead to conclude that profitable banks tend to hold more capital. The results show that better performance in banks lead to higher capital ratio during all periods of economic cycles. Most of the coefficients are statistically significant which lets to affirm the positive impact of performance on bank capital structure.

Empirical evidence provided by the variable LLR/Gross loans is not as strong as other variables. However, two of the regressions provide the same evidence for this coefficient. Hence, the results show that loan loss reserves have a positive impact on capital ratio. This attitude might be triggered by two reasons. First, regulations require banks to hold more reserves for higher loan losses. Secondly, banks might be interested in holding more reserves themselves, in order to prevent possible loan losses. This ratio can be also treated as a measure of bad performance. Therefore, the findings from Net Income and Loan Loss Reserve lead to conclude that both good and bad performance have a positive impact on bank capital ratio. However, the finding with bad performance is not as strong as with good performance.

Customer deposits as an integral part of bank assets affect capital ratio negatively. All of the coefficients are statistically significant in 1-10% significance levels. The empirical evidence shows that the more banks have customer deposits the less they hold capital. Since, customer deposits occupy significant proportion of total assets they can be interpreted as a bank size measure as well. Therefore, the findings of the empirical tests with customer deposits support the findings with total assets that large banks tend to hold lower capital ratio under all economic conditions. The coefficients of bank deposit ratios are highly statistically significant in all regressions except for the first periods. These results once more support the findings from Total Assets and Customer Deposits variables. According to the empirical results deposits from banks decrease capital ratio, hence they have a negative impact.

The next two variables, non-interest income and net-interest income, provide little empirical evidence. Only non-interest income coefficients are statistically significant during the period prior to the crisis. The results show that before the crisis non-interest income had very small positive impact on capital ratio. These findings let to conclude about the impact of bank type to capital ratio. Hence, they lead to state that before the crisis banks affiliated with non-traditional banking activities held more capital than those affiliated with traditional activities. However, this statement is not supported by strong evidence.

Interest rate variable is highly statistically significant for the periods during and after crisis through most of the regressions. According to the results interest rates affect bank capital ratio negatively. This might be mainly because rising interest rates prevent banks from growing and lower or smooth their share values. The effect is negative through all periods of economic cycle which lets to conclude about the persistence of the negative impact. Finally, the last variable, government effectiveness, is statistically significant only during economic crisis period. Apparently, bank capital ratio is not affected by the governance during good times. During economic downturns, good governance decreases capital ratio. This might be mainly because the applied economic and public policy during economic downturns that helps banks to grow. The growth leads to lower capital ratios as it was suggested by the findings with total assets variable. However, this finding is not supported by strong evidence.

As proxies for crisis ROAA and GDP growth provide contradicting evidence for the post crisis period. However, ROAA is mainly a bank performance measure; therefore it basically helps to conclude how good performance affects bank capital ratio. Apparently, good performance has a positive impact on capital ratio. This evidence is consistent with the findings from Net Income variable. As a performance measure net income provides strong evidence about a positive relation between performance and capital ratio which is supported by ROAA coefficients as well. On the other hand, GDP growth coefficients illustrate more accurate information about the impact of crisis on bank capital. GDP growth coefficients mainly prove the first hypothesis of this thesis. Hence, GDP growth had a positive impact on capital ratio prior to crisis and the impact turned to negative in post crisis period. According to these results banks tend to increase their capital under good economic conditions. Raising capital is not costly during economic expansion as suggested by theories and previous empirical research. On the other hand during crises and post crisis periods raising capital becomes costly process. Negative impact of GDP growth variable in the post crisis period is a result of the long lasting consequences of the crisis. These findings mainly provide sufficient evidence for accepting the first hypothesis and achieve one of the purposes of the thesis.

Along with these regressions the regressions with the differences has been carried out in order to test robustness of the results. First differences of variables except GDP growth, MRR and Interest rate have been used in the regressions. Since GDP growth is already attributed in changes and MRR and Interest rate do not change much through observed years the changes have not been used for these variables. The results of these regressions firmly support the findings for the variable Total Assets. The coefficients

are all negative and statistically significant through each period. Other variables are not statistically significant in the regressions with the differences.

Table 6 reports how one standard deviation change in significant variables affects average capital ratio in different periods. Only the regressions with GDP growth are interpreted. Averages are calculated by multiplying each significant coefficient with its mean for the corresponding period. Standard deviation changes are calculated as described in the formula (14). Percentage changes are calculated as the percentage deviations from average Equity/Total Assets ratio.

Table 6. Impact of 1 standard deviation increase on capital ratio.

	04-06		07-09		10-12	
	s.dev change	% change	s.dev change	% change	s.dev change	% change
Ln(TA)	-0.8327	-8.99%	-0.8446	-8.22%	-0.7380	-10.19%
Ln(NetIncome)	0.1952	1.93%	0.0697	0.63%	0.0339	0.42%
LLR/Gross Loans	0.0736	0.73%				
Customer dep/TA	-0.1742	-1.76%	-0.1363	-1.24%	-0.2129	-2.74%
Bank dep/TA			-0.0703	-0.64%	-0.1379	-1.76%
Non-interest Inc	0.0076	0.08%				
Net Interest Inc						
ROAA						
ROAE						
GDP Growth	0.0325	0.32%			-0.0321	-0.40%
MRR					0.0578	0.72%
Interest Rate			-0.0376	-0.34%	-0.0872	-1.10%
Gov. Eff.			-0.0281	-0.25%		
Constant	84.9431		105.4137		103.5058	
Average E/TA	10.0969		11.1201		7.9819	

According to the Table 6 before the crisis a negative impact of one standard deviation increase of total assets on capital ratio was 8.99%. The impact has decreased slightly during the crisis and increased significantly after the crisis. Positive impact of net income has decreased from 1.93% to 0.63% during crisis and continued decreasing in post crisis period. Before the crisis one standard deviation increase in Loan loss reserves/Gross loans ratio have been increasing average capital ratio by 0.73%. The impact of one standard deviation in Customer deposits/Total assets and Bank

deposits/Total assets ratios have also increased after the crisis. Before the crisis one standard deviation increase in GDP growth was leading to 0.32% increase in average capital ratio. However, in the post crisis period it leads to 0.40% decrease in average capital ratio. Negative impact of interest rates has also increased in post crisis period.

6.2. Dynamics of funding structure

Table 7 reports the results of the regression (8) with dependent variables Short-term Liabilities / Total Assets and Long-term liabilities / Total Assets (left side and right side respectively). The results from regression with only GDP growth as a proxy for crisis are reported because ROAA regressions have the same outcomes and ROAE regressions are not helpful in explaining the dependent variables. GDP growth column is highlighted in the table in order to focus the attention to the most important explanatory variable of the regressions.

According to the results Total Assets have a positive impact on both short-term and long-term funding. However, the positive impact is significant during certain periods. The coefficient of Total Assets is highly statistically significant during crisis time, which leads to conclude that larger banks had more short-term funding than smaller banks during crisis. Identically, it can be concluded that larger banks had more long-term funding during recovery period. It is not possible to conclude about how different types of funding are affected by bank size, however apparently they are not affected by the size under good economic conditions.

Net income as a reward for good performance affects funding structure only during economic downturns. According to the results higher income increases short-term funding and decreases long-term funding. This finding is reasonable in the sense that better performance creates more public assurance and helps to attract more deposits. Since deposits (short-term funding) are core source of funding for most banks this finding is fair enough.

The impact of customer deposits and bank deposits on both type of funding is persistent through all periods of economic cycle. They have a positive impact on short-term funding and negative impact on long-term funding. Since customer deposits and bank deposits mainly have relatively shorter period of maturity compared to other sources of funding these findings are also reasonable.

Table 7. Dynamics of short-term and long-term liabilities.

<i>Proxy for crisis:</i> GDP growth						
<i>Dependent variable:</i>	Short-term / TA			Long-term / TA		
<i>Sub periods:</i>	04-06	07-09	10-12	04-06	07-09	10-12
Ln(TA)	0.0106* (0.0868)	0.0516*** (0.0000)	-0.0007 (0.9779)	0.0388 (0.1886)	-0.0018 (0.9237)	0.0524** (0.0316)
Ln(NetIncome)	0.0006 (0.7659)	0.0026* (0.0521)	-0.0005 (0.8391)	-0.0066 (0.3609)	-0.0045** (0.0272)	-0.0019 (0.4661)
LLR/Gross Loans	-0.0003 (0.4952)	-0.0022 (0.1527)	0.0026** (0.0240)	-0.0027 (0.0783)	0.0033* (0.0697)	-0.0034 (0.2080)
Customer dep/TA	0.9096*** (0.0000)	0.8613*** (0.0000)	0.8153*** (0.0000)	-0.6858*** (0.0000)	-0.5297*** (0.0000)	-0.5026*** (0.0003)
Bank dep/TA	0.9435*** (0.0000)	0.8173*** (0.0000)	0.9526*** (0.0000)	-0.7935*** (0.0000)	-0.5384*** (0.0000)	-0.7080*** (0.0001)
Non-interest Inc	0.0000 (0.6572)	0.0000 (0.3187)	0.0000* (0.0569)	0.0000 (0.5035)	0.0000** (0.0268)	0.0000 (0.5756)
Net Interest Inc	0.0000 (0.7441)	0.0000 (0.3584)	0.0000 (0.7398)	0.0000 (0.7464)	0.0000** (0.0298)	0.0000 (0.6931)
GDP Growth	-0.0031** (0.0327)	-0.0022*** (0.0001)	-0.0044*** (0.0020)	0.0028 (0.2756)	0.0034*** (0.0000)	0.0093*** (0.0000)
MRR	-0.0026 (0.1181)	0.0034* (0.0904)	-0.0180*** (0.0000)	0.0011 (0.8381)	-0.0034 (0.2204)	0.0117** (0.0463)
Interest Rate	-0.0021 (0.1443)	-0.0001 (0.9619)	0.0350*** (0.0004)	0.0013 (0.5218)	0.0007 (0.7137)	-0.0214* (0.0737)
Gov. Eff.	0.0400*** (0.0001)	-0.0826*** (0.0000)	-0.0846*** (0.0011)	-0.0504*** (0.0000)	0.1465*** (0.0000)	0.0575** (0.0386)
Constant	-0.1165 (0.2323)	-0.5656*** (0.0001)	0.2473 (0.3131)	0.2046 (0.5415)	0.4278 (0.1451)	-0.3266 (0.3129)
Observations	2251	3542	5254	2042	3248	2493
F-statistic	71.1456	85.2176	16.5327	34.1633	46.7779	10.8303
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

* Significant in 10% level

** Significant in 5% level

*** Significant in 1% level

Next two income measures have statistically significant positive impact on long-term funding only for the crisis time. Along with being measures of income these two variables can also be interpreted for distinguishing between traditional and innovative banking activities. Therefore, it can be concluded that independently from the nature of their activities additional income during the crises had affected long-term funding

positively. This finding is contradicting to the finding with net income variable if all three variables are interpreted as performance measures.

Apparently, none of the funding is affected by the conditions in the economy. The impact of GDP growth is always negative for the short-term funding and positive for the long-term funding. These results do not let to conclude how the crisis affected funding structure of banks; therefore the impact of the crisis will be discussed with the standard deviation change in the following paragraphs. The findings with the MRR and Interest rate suggest that macroeconomic conditions during and after the crisis were in favor of short-term funding. Hence, MRR affects short-term funding positively during the crisis while it is supposed to affect it negatively. The conditions turn to normal for MRR after the crisis. While Interest rates during post crisis period help to increase short-term funding, MRR help increase long-term funding for the same period. However, the statistical tests applied in this study do not allow controlling which of them adds more value for the contributed sources of funding.

Table 8. Impact of 1 standard deviation increase on short-term and long-term funding.

	Short-term/TA			Long-term/TA		
	2004-2006	2007-2009	2010-2012	2004-2006	2007-2009	2010-2012
	% change	% change	% change	% change	% change	% change
Ln(TA)	11.08%	68.25%				174.12%
Ln(NetIncome)		3.73%			-23.61%	
LLR/Gross Loans			10.39%		25.71%	
Customer dep/TA	104.07%	122.49%	154.57%	-147.23%	-275.26%	-177.51%
Bank dep/TA	86.98%	93.56%	136.05%	-137.25%	-225.25%	-188.37%
Non-interest Inc			3.38%		12.34%	
Net Interest Inc					13.73%	
GDP Growth	-2.17%	-4.87%	-6.24%		25.82%	23.33%
MRR		4.62%	-26.88%			25.62%
Interest Rate			28.50%			-32.44%
Gov. Eff.	8.98%	-31.38%	-41.19%	-21.23%	154.77%	36.95%
Average Sh-t/TA	0.93	0.74	0.56	-0.65	-0.23	0.40

Finally, the interpretation of Government Effectiveness variable let to conclude that before the crisis government policies were in favor of short-term funding, whereas they started working in favor of long-term funding during and after crisis. The robustness

tests with the differences of variables affirm the results for customer deposits, bank deposits and non interest income variables. Other variables are not statistically significant in the regressions with differences.

Table 8 illustrates how 1 standard deviation increase in statistically significant variables can change average short-term and long-term funding. According to the table the standard deviation increase in almost all variables caused extremely high changes, either increase or decrease, in the average funding structure during the crisis time. Customer deposits and bank deposits were two crucial variables for the changes in long-term funding during the crisis. On the other hand, short-term funding reacts to the changes in those variables more moderately during all periods of economic cycle: the impact increases harmonically. While size factor (Total Assets) has been affecting short-term funding during the crisis more strongly, it has significantly large impact on long-term funding in post-crisis period. The findings from Table 7 and the results from Table 8 mainly allow to accept the second hypothesis of the thesis about the changing patterns of the funding structure of banks around the crisis.

6.3. Empirical tests of further hypotheses

Table 9 reports the results of the regression (8) for Scandinavian and European countries included in the whole sample. Scandinavian countries contain Denmark, Norway, Sweden and Finland. The results of the regressions for both geographic areas are identical to the results of the whole sample. Total assets have a negative impact on capital ratio and most of the variables are highly statistically significant. This negative impact has also been affirmed by other regressions with the differences. The negative impact of the size to capital ratio is persistent through all regressions. Net income has a positive impact as in the test with the whole sample. Customer deposits and bank deposits have a negative impact on capital structure in both geographical regions. However, they are not highly significant for Scandinavian countries.

GDP growth coefficient, proxy for the periods of economic cycle, is positive for the Scandinavian countries during the crisis. It is negative in the post crisis period as in the regressions with the whole sample. It is interesting to mention that the coefficient of GDP growth for the Scandinavian countries is positive, while it is only positive for other European countries and for the whole sample during the period prior to the crisis.

This might lead to conclude that economic conditions in the Scandinavian countries were not harsh during the crisis and the reaction of bank capital ratios to them was

Table 9. Comparison of Scandinavian and European countries.

<i>Proxy for crisis:</i> GDP growth						
<i>Dependent variable:</i>	Equity / TA			Equity / TA		
<i>Geographic area:</i>	Scandinavian countries			Other European countries		
<i>Sub periods:</i>	04-06	07-09	10-12	04-06	07-09	10-12
Ln(TA)	-3.9022 (0.2672)	-3.2789 (0.1680)	-1.7442** (0.0480)	-6.1085*** (0.0001)	-6.5498*** (0.0000)	-5.2789*** (0.0011)
Ln(NetIncome)	0.8525* (0.0907)	0.3267 (0.2005)	0.1760 (0.2008)	1.2098*** (0.0041)	0.4731*** (0.0000)	0.2624*** (0.0029)
LLR/Gross Loans	0.3144 (0.3456)	0.7007 (0.2491)	0.1063 (0.6666)	0.2830* (0.0902)	0.1539 (0.4340)	0.0204 (0.8799)
Customer dep/TA	-45.6159* (0.0846)	-3.8143 (0.7073)	2.9899 (0.2952)	-10.9873* (0.0546)	-9.5581*** (0.0041)	-11.0148 (0.1043)
Bank dep/TA	-34.7404* (0.0918)	2.2351 (0.7996)	-4.4114 (0.1941)	-7.0575 (0.3945)	-5.9537** (0.0152)	-12.177*** (0.0009)
Non-interest Inc	0.0000 (0.2604)	0.0000 (0.3715)	0.0000 (0.9627)	0.0000*** (0.0040)	0.0000* (0.0686)	0.0000 (0.6471)
Net Interest Inc	0.0000 (0.2359)	0.0000 (0.2420)	0.0000 (0.7243)	0.0000 (0.3927)	0.0000** (0.0503)	0.0000 (0.3645)
GDP Growth	0.5315 (0.2659)	0.2277** (0.0448)	-0.1075* (0.0929)	0.3897*** (0.0051)	-0.0431 (0.1127)	-0.2119*** (0.0002)
Interest Rate	0.8291 (0.4500)	-0.3550 (0.1263)	-0.4795** (0.0244)	-0.2109 (0.1805)	-0.3096*** (0.0000)	-0.5976*** (0.0003)
Gov. Eff.	-6.5951** (0.0166)	3.7974* (0.0871)	1.3706 (0.2737)	0.6210 (0.1717)	-1.5245*** (0.0072)	1.0403 (0.5021)
Constant	98.8133 (0.1226)	49.8605 (0.1468)	29.7054** (0.0256)	89.7553*** (0.0000)	108.0397*** (0.0000)	89.6122*** (0.0013)
Observations	174	202	292	2072	3053	3960
F-statistic	48.2141	33.6417	147.2799	46.1841	66.1019	46.4623
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

* Significant in 10% level

** Significant in 5% level

*** Significant in 1% level

similar to the period prior to the crisis. However, the impact changes to negative in post crisis period which means that long lasting recession ultimately affected Scandinavian banks as well. In other words, even if the Scandinavian banks were prepared for the crisis, its long lasting effect has influenced them as well.

Interest rates have negative impact on capital ratio in both sub groups. According to the results government effectiveness had a negative impact on capital ratio of Scandinavian banks prior to the crisis. This variable has contradicting impact on two different sub groups during the crisis: it is positive for the Scandinavian countries and negative for other European countries. Apparently, policies applied during the crisis helped to increase the capital of banks in Scandinavian countries, while it was not helpful in other European countries. This finding supports the finding with the GDP growth variable.

Table 10 illustrates the impact of standard deviation increase in variables on capital ratio in two different sub groups. According to the table a positive impact of a standard deviation increase is smaller and a negative impact is larger for Scandinavian countries. One standard deviation increase in GDP growth during the crisis caused 0.87% increase in average capital ratio. This number is larger than the 0.36% increase for the European countries for the period prior to the crisis. Apparently, Scandinavian banks were able to maintain higher capital ratios during the crisis. Mainly these results from table 10 support the findings from table 9 and prove the third hypothesis of this thesis.

Table 10. Impact of 1 standard deviation increase on capital ratio.

	Scandinavian countries			Other European countries		
	2004-2006	2007-2009	2010-2012	2004-2006	2007-2009	2010-2012
	% change	% change	% change	% change	% change	% change
Ln(TA)			-5.02%	-8.62%	-8.78%	-4.64%
Ln(NetIncome)	0.37%			1.94%	0.69%	0.25%
LLR/Gross Loans				0.73%		
Customer dep/TA	-1.92%			-1.69%	-1.38%	
Bank dep/TA	-1.18%				-0.69%	-0.86%
Non-interest Inc				0.22%	0.18%	
Net Interest Inc					0.12%	
GDP Growth		0.87%	-0.23%	0.36%		-0.14%
Interest Rate			-0.63%		-0.31%	-0.24%
Gov. Eff.	0.54%	2.02%			-0.45%	
Average Sh-t/TA	-37.62	5.48	4.33	10.27	9.96	14.18

In order to test the fourth hypothesis of the thesis the regression model described in formula (11) have been applied to several selected countries with the sufficient number of observations from the year 2007 to 2010. The regression results provide only little sufficient information. Therefore, it is not possible to make conclusions and to apply those findings to general sample. The fourth hypothesis of the thesis has not been proved because of the lack of information. Other three hypotheses have been accepted with sufficient empirical evidence.

7. SUMMARY AND CONCLUSIONS

Financial crisis of late 2000s raised a lot of questions in the efficiency of bank regulation and regulation of financial system as a whole. Since banks are more entwined with economy and wealth of people compared to any other time in the history, scholars, governments and general public became more interested in efficient bank regulation and supervision. Therefore, the problems addressed in this thesis are interesting to investigate in the light of the recent financial crisis.

Because of the importance of the topic this thesis focuses on the dynamics of bank capital and funding structure around latest financial crisis. Moreover, the thesis investigates the impact of the crisis on the group of four Scandinavian countries and compares it to the whole sample (excluding the US). The purpose of this comparison is to find differences in capital structure choice of banks in these countries and draw conclusions about better policies.

The data used in this study contains banks from the US, UK and 26 European countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Switzerland. The whole sample includes 6927 individual banks from these countries. Sample period captures years from 2004 to 2012 and divided into three sub periods: pre crisis, crisis and post crisis. The first period contains years 2004-2006, the second 2007-2009 and the third 2010-2012.

Fixed effects panel estimation with OLS estimator for variable coefficients is employed in order to execute empirical tests. Fixed effects panel estimation assumes that there are always unobserved non-changing factors affecting output through cross-sections and it eliminates them in order to prevent biased results. Therefore, dummy variables are not used for empirical tests and country specific and firm specific factors are assumed to be eliminated.

The findings from the regressions with the capital ratio as a dependent variable mainly prove the first hypothesis of this thesis. As a proxy for the different periods of economic cycle GDP growth provides sufficient empirical evidence. Hence it had a positive impact on capital ratio prior to crisis and the impact turned to negative in post crisis period. According to these results banks tend to increase their capital under good economic conditions. Raising capital is not costly during economic expansion as

suggested by theories and previous empirical research. On the other hand, during crises and post crisis periods raising capital becomes costly process. Negative impact of GDP growth variable in the post crisis period is a result of the long lasting consequences of the crisis. Other findings suggest that bank size, short-term funding (customer deposits and bank deposits) and interest rates have a negative impact on the capital ratio in all times. Net income and non-interest income have a positive impact on the capital ratio. Loan loss reserves also have a positive impact on the capital ratio; however it is significant only during good economic conditions.

Findings from the regressions with short-term and long-term funding suggest that the crisis has mainly affected long-term funding of banks. This finding is supported by theory and previous research as well. Hence, during crisis uncertainty about the future makes difficult to receive long-term funding. It also makes short-term funding more costly. The empirical findings also suggest that before the crisis government policy was supporting short-term funding of banks. However, during and after crisis the policies turned in favor of long-term funding. Apparently, governments became more interested in sustainability of bank funding. Since, Scandinavian banks outperformed during the crisis their practices can be learned and applied in other countries. However, it is important to take into account local conditions in those countries. Therefore, in order to apply their banking practices in other countries efficiently not only bank specific practices but also country governance practices must be taken into account.

Finally, empirical findings from the regressions with Scandinavian countries suggest that, these countries suffered less from the crisis. Hence, GDP gross variable has a positive impact on capital ratio for Scandinavian banks during the crisis. This impact is positive for the whole sample only during the period prior to the crisis and statistically equal to zero during the crisis. Therefore, the conclusion can be made about better capital ratios of Scandinavian banks during the crisis. Moreover, the effectiveness of government policies has also outperformed in Scandinavian countries during the crisis. Mainly, capital structure of the banks of Scandinavian countries suffered less from the crisis.

This thesis is mainly contributing to the existing literature by investigating the patterns of capital and funding structure of 29 EU/EFTA countries and the USA banks around latest financial crisis. A study for such a wider sample around latest crisis has not been conducted yet. Moreover, it contributes to the existing literature by making comparisons between Scandinavian and other countries. The thesis finds sufficient evidence in favor of Scandinavian banks.

As stated in the first chapter major limitation of the thesis is the applied methodology. The fixed effects panel estimation applied in the thesis does not allow to control for country specific, bank specific and other factors because dummy variables are not applicable for this estimation method. Another limitation of the thesis is the geographical area of sample countries. Since the sample includes countries only from Europe and the US general conclusions for all banks of the world cannot be made with the findings of this thesis. It is important to extend sample and include at least significant countries from each continents to draw general conclusions for the dynamics of bank capital structure around crises. The countries can be divided into different groups due to the level of their development. It is important to apply more advanced empirical methods, such as GMM dynamic panel estimation in order to get more accurate empirical evidence. This method will give a chance to control for country specific and bank specific factors, e.g. bank size, as well.

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