

MASTERARBEIT

Titel der Masterarbeit

„Do the societal and entrepreneurial costs of increased capital requirements in banking overcome the benefits? “

Verfasst von

Thomas Papazakas

angestrebter akademischer Grad

Master of Science (MSc)

Wien, 2015

Studienkennzahl lt. Studienblatt:
Studienrichtung lt. Studienblatt:
Betreuer / Betreuerin:

A 066 914
Masterstudium Internationale Betriebswirtschaft
Ao. Univ.-Prof. Dr. Jörg Borrmann

Abstract

Since the outbreak of the financial crisis, there has been an on-going debate in the regulatory environment on increasing capital requirements in the banking industry, with the objective of a safer financial system. The following thesis conducts a cost-benefit analysis of higher capital requirements in banking in order to answer the following research question: “Do the societal and entrepreneurial costs of increased capital requirements in banking overcome the benefits?” The benefits and costs of increased capital requirements are measured in terms of their impact on GDP. This thesis concludes that, in the long run, the benefits of a tighter regulatory environment overcome the costs.

Key words: Banks / Capital Requirements / Liquidity Requirements / Bank Regulation / Basel III / Shadow Banking System

Zusammenfassung

Seit dem Ausbruch der Finanzkrise gibt es im Umfeld der Regulierung eine andauernde Debatte über steigende Kapitalanforderungen in der Finanzindustrie mit dem Ziel eines sichereren Finanzsystems. Die folgende Arbeit führt eine Kosten- Nutzen-Analyse von höheren Kapitalanforderungen durch, um die folgende Forschungsfrage zu beantworten: “Übersteigen die sozialen und unternehmerischen Kosten höherer Kapitalanforderungen deren Nutzen?” Die Kosten und der Nutzen höherer Kapitalanforderungen werden hierbei anhand ihres Einflusses auf das Bruttoinlandsprodukt gemessen. Diese Arbeit zeigt, dass langfristig der Nutzen eines engeren Regulierungsumfelds dessen Kosten übersteigen.

Schlüsselwörter: Banken / Kapitalanforderungen / Liquiditätsanforderungen / Bankenregulierung / Basel III / Schattenbankensystem

Dedicated to my family

Eidesstattliche Erklärung

Ich erkläre hiermit an Eides Statt, dass ich die vorliegende Arbeit selbständig und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe. Die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sind als solche kenntlich gemacht. Die Arbeit wurde bisher in gleicher oder ähnlicher Form keiner anderen Prüfungsbehörde vorgelegt und auch noch nicht veröffentlicht.

Wien, am 03.09.2015

Table of Contents

Table of figures	vii
List of tables	viii
List of charts	ix
List of diagrams	ix
List of graphs	ix
List of abbreviations	x
Chapter 1. Introduction	1
Chapter 2. Bank regulation, systemic risk & shadow banking	5
2.1. The importance of bank regulation	5
2.2. A historical overview of the Basel accords	8
2.2.1. Basel I - the first Basel capital accord	9
2.2.2. Towards Basel II	9
2.2.3. Basel III	10
2.3. The importance of systemic risk in the financial sector	13
2.4. The shadow banking system	18
Chapter 3. Arguments in favour of increased capital requirements	26
3.1. Defining capital regulation	26
3.2. Main arguments towards increasing bank capital requirements	28
Chapter 4. The societal and entrepreneurial costs of increased capital requirements	36
Chapter 5. Are the societal and entrepreneurial costs of increased capital requirements in banking greater than the benefits?	60
Chapter 6. A cost–benefit analysis	67
Chapter 7. Proposals for better regulation in the banking industry	72
7.1. The need for a systemic regulator and for better information mechanisms for regulators	72
7.2. Contingent convertible securities (CoCos)	73

7.3. Regulating executive compensation	74
7.4. Resolution mechanisms	75
7.5. OTC derivatives and clearinghouses or Central Counterparties (CCPs).....	75
7.6. Capital requirements.....	77
7.7. The relationship between banking and politics	80
Chapter 8. Conclusions	81
Chapter 9. References	82
9.1. Books.....	82
9.2. Journal articles.....	83
9.3. Publications / research papers / reports / online documents from non-profit organizations	84
9.4. Working papers.....	87
9.5. Magazine / newspaper articles.....	88
9.6. Others.....	90
Appendix	I
Curriculum Vitae	I

Table of figures

Figure 1. The growth of shadow bank liabilities compared to traditional bank liabilities (Source: Flow of Funds Accounts of the United States as of 2010:Q1 FRB and FRBNY)....	20
Figure 2. The relationship between the probability of systemic crises and the ratio of capital over risk-weighted assets (Source: Schanz et al., 2011).....	31
Figure 3. The effect of increased equity on the ROE (Source: Admati et al., 2011).....	34
Figure 4. Alternative responses to increased capital requirements (Source: Admati et al., 2011).....	61
Figure 5. Cumulative output gains per percentage point increase in capital adequacy and liquidity standards (Source: Barrell et al., 2009).....	71

List of tables

Table 1. Phase-in arrangements of Basel III Accord (Source: BCBS).....	13
Table 2. The effects of tighter capital requirements in the Euro Area (Source: Roger & Vlček, 2012).....	42
Table 3. The effects of tighter capital requirements in the United States (Source: Roger & Vlček, 2012).....	42
Table 4. The effects of tighter liquidity requirements in the Euro Area (Source: Roger & Vlček, 2012).....	45
Table 5. The effects of tighter liquidity requirements in the United States (Source: Roger & Vlček, 2012).....	45
Table 6. Plausible bounds for appropriate capital requirements (Source: Schanz et al., 2011).....	68
Table 7. Optimal capital ratios considering the full distribution of bad events (Source: Miles et al., 2012).....	69
Table 8. Optimal capital ratios ignoring the most extreme bad events (Source: Miles et al., 2012).....	69

List of charts

Chart 1. Impact of higher capital and liquidity requirements on real GDP and employment (Source: IIF, 2010).....	48
Chart 2. ROE for the 5 largest US banks during Q1 2003 until Q3 2014 (Source: Levine, 2015).....	56
Chart 3. Common equity to total assets for US banks from Q1 2003 to Q3 2014 (Source: Levine, 2015).....	56
Chart 4. ROA for the US banks during Q1 2003 until Q3 2014 (Source: Levine, 2015).....	57

List of diagrams

Diagram 1. The securitization process (Source: Noeth & Sengupta, 2011).....	22
--	----

List of graphs

Graph 1. Long-run expected annual net economic benefits of increases in capital and liquidity ratios (Source: BCBS, 2010).....	68
---	----

List of abbreviations

ABS = Asset-backed security

ASF = Available stable funding

BCBS = Basel Committee on Banking Supervision

BIS = Bank for International Settlements

CCB = Countercyclical capital buffer

CCPs = Central counterparties

CoCos = Contingent convertible securities

CDOs = Collateralized debt obligations

CRP = Centre for Responsive Politics

DSGE = Dynamic stochastic general equilibrium models

ECB = European central bank

FDI = Federal Deposit Insurance

FDIC = Federal Deposit Insurance Corporation

FRA = Federal Reserve Act

FRB = Federal Reserve Board

FRBNY = Federal Reserve Bank of New York

FSB = Financial Stability Board

GDP = Gross domestic product

GFSR = Global Financial Stability Report

ICN = International Competition Network

IIF = Institute of International Finance

IMF = International Monetary Fund

LCR = Liquidity coverage ratio

LOLR = Lender of last resort

LTV = Loan-to-value

MAG = Macroeconomic Assessment Group

MBS = Mortgage-backed securities

MMMFs = Money market mutual funds

NFB = Narrow funding banks

NPV = Net present value

NSFR = Net stable funding ratio

OECD = Organization for Economic Co-operation and Development

OTC = Over the counter

ROA = Return on assets

ROE = Return on equity

RWA = Risk-weighted assets

RSF = Required stable funding

SBS = Shadow banking system

SIFI = Systemically important financial institutions

SPV = Special purpose vehicle

TCE = Tangible common equity

WEF = World Economic Forum

WACC = Weighted average cost of capital

Chapter 1. Introduction

The on-going financial crisis has sent tremendous shockwaves throughout the financial system. As the former French president Nicolas Sarkozy put it at one of the international meetings of the World Economic Forum (WEF) in Davos, “the world has paid with tens of billions of unemployed who were in no way to blame and who paid for everything. It caused a lot of anger... We saw that for the last 10 years, major institutions in which we thought we could trust had done things which had nothing to do with simple common sense”¹ (Nicolas Sarkozy, President of the French Republic, Davos, Switzerland, January 27, 2011).

The extreme losses suffered by the economy and, most importantly, individuals due to the crisis has shifted the attention to the role of banks. Many individuals have lost their fortunes and major economies have been put under threat. However, both before and during the crisis, banks took excessive risks by investing shamelessly without considering the impact of their actions. Bonus increases for managers were more important than the risks undertaken, which had a substantial negative impact on society.

Due to the hazards caused by banks in the recent financial crisis, the regulation of banks has become a hot debate topic in the worlds of both academics and banking practitioners. Regulation refers to certain accepted rules that banks should comply with in order to preserve the soundness of the financial system (Barth, Caprio & Levine, 2006). The industry of banking regulation has undergone significant changes during the last years, turning towards a stricter regulatory environment. Based on a new regulatory framework proposed by the Basel Committee on Banking Supervision (BCBS), a wide range of new reforms have been recommended, with the aim of improving the resilience of the banking sector against the incidence of future shocks (BCBS, 2009). However, the banking sector did not respond

¹ Taken from the book by Admati & Hellwig titled *The Banker's New Clothes. What's Wrong with Banking and What to Do about it* (Admati & Hellwig, 2013, p. 1).

cordially to the idea of tighter banking regulation which, on the contrary, it lobbied against (Admati & Hellwig, 2013). The Centre for Responsive Politics (CRP) reports that lobbying by commercial banks has increased substantially, especially after the outburst of the financial crisis. The amount of money spent on lobbying by commercial banks came to \$61,591,596² in 2012.

Another result of the events of 2007-2009 was that they highlighted the importance of “systemic risk”³. Problems in small financial intermediaries can easily expand to large ones and, as a result, endanger the whole financial system. Hellwig argues that a shock in the financial system impacts the real economy and vice versa (Hellwig, 2012). This research paper will examine the concept of systemic risk in the following chapters.

The significant role of the SBS during the recent financial crisis will not be left out of this research paper. Banks relied heavily on the SBS which is also blamed for enhancing the propagation of risks during the crisis. The Financial Stability Board⁴ (FSB) reports that the SBS grew substantially in 2013, reaching an amount of \$71trillion⁵. This is a matter of concern for regulators because most of the SBS remains, even nowadays, unregulated or not as strictly regulated as banks.

At present, the discussion about regulatory reform is focused on the need for increased capital requirements and, more specifically, about the societal and entrepreneurial costs of increased capital requirements. Admati, DeMarzo, Hellwig and Pfleiderer (henceforth Admati et al.) support the view that increased capital requirements in banking are not socially expensive and high leverage in banking is not socially or privately optimal (Admati et al., 2011). They conclude that increased capital requirements are socially and entrepreneurially optimal and

² Commercial Banks. *Centre for Responsive Politics*. <http://www.opensecrets.org/>. Accessed 11 April 2015. Retrieved from <http://www.opensecrets.org/lobby/indusclient.php?id=F03&year=2012>.

³ Systemic risk refers to the risk which comes as a result of proliferation of shocks in the financial system (Hellwig, 2012).

⁴ The Financial Stability Board is a regulatory authority created to “coordinate at an international level the work of national financial authorities and international standard setting bodies and to develop and promote the implementation of effective regulatory, supervisory and other financial sector policies. It brings together national authorities responsible for financial stability in significant international financial centres, international financial institutions, sector-specific groupings of regulators and supervisors, and committees of central bank experts”. About the FSB. *The Financial Stability Board*. <http://www.financialstabilityboard.org>. Accessed 11 April 2015. Retrieved from <http://www.financialstabilityboard.org/about/overview.htm>.

⁵ See the Global Shadow Banking Monitoring Report (FSB, 2013).

highlight the need for more regulation in equity issuance and pay-outs to prevent lending distortions and improve the efficiency of capitalization (Admati et al., 2011).

Elliott is of the view that increased capital requirements would be socially and entrepreneurially costly (Elliott, 2009). Businesses and individuals would face difficulties in obtaining loans, loans would become costlier, the claims given to depositors and any other suppliers of funds would be much lower and the market value of banks' common stock would decrease. The same author offers another opposing view where he argues that increased capital requirements would result in an increase in interest rates on loans, in a reduction in the total level of deposits and, as a result, in reduced lending (Elliott, 2010). The author places emphasis on the need for an increase in the net return on loans by rejecting less attractive loans, charging higher interest rates for those undertaken and reducing the interest rates on demand deposits. The aim is to increase the margin between the interest rates which are earned on loans and the interest rates used to fund the loans (Elliott, 2010).

A viewpoint against increased capital requirements is that higher capital ratios would make bankers more complacent and, as a consequence, would decrease their intermediation effort substantially (Hahn & Hölzl, 2014). In an empirical study, where 281 small to medium sized banks were examined during the period 1995-2012, the authors found that there is a non-linear impact of higher capital on credit creation. Hahn and Hölzl found that low performance banks increase credit creation when bank capital is increased. However, high performance banks decrease credit creation when bank capital is increased. This suggests that bank capital regulation is substantially useful for small banks because it impacts positively their lending behaviour.

Rajan and Diamond present the view that increased capital requirements reduce the creation of liquidity ⁶by banks, however, it reduces the probability of financial distress ⁷ (Rajan & Diamond, 1999). They developed a model where the optimal bank capital structure can be achieved "by trading off the effects of bank capital on liquidity creation, the expected costs of bank distress and the ease of forcing borrower repayment" (Rajan & Diamond, 1999).

⁶ Liquidity is defined as the "ease and speed" with which an asset can be converted into cash (Mishkin, 2010). See Mishkin, F. S. *The Economics of Money, Banking and Financial Markets*. 9th Edition.

⁷ Financial distress describes a situation in which a firm has difficulties to meet its obligations towards its creditors (Berk, DeMarzo, Harford, 2011). See Berk, J., DeMarzo, P., Harford, J., *Fundamentals of Corporate Finance*. 2nd Edition.

Given the variety of approaches that exist in the current debate about the social and entrepreneurial benefits and costs of increased capital requirements, the objective of the following Master Thesis is to try to answer the following research question: *Do the societal and entrepreneurial costs of increased capital requirements in banking overcome the benefits?*

Based on current theoretical knowledge, the aim of this research paper is to try to balance the societal and entrepreneurial costs and benefits of increased capital requirements. Following certain specific assumptions, this paper aims to investigate whether or not an increase in capital requirements is nowadays beneficial for banks and society.

This research paper is structured as follows: Chapter 2 provides an overview of bank regulation and why it has become extremely important. The same chapter also includes a historical analysis of bank capital requirements based on the accords of BCBS, as well as an explanation of the importance of systemic risk, securitization and SBS. The core of the analysis can be found in Chapters 3, 4, 5 and 6. Chapter 3 outlines the arguments in favour of increased capital requirements, while Chapter 4 presents the societal and entrepreneurial costs of increased capital requirements. Chapter 5 discusses the research question and Chapter 6 conducts a cost-benefit analysis. Chapter 7 presents certain recommendations for better regulation of the banking industry. Finally, Chapter 8 consists of the concluding remarks.

Chapter 2. Bank regulation, systemic risk & shadow banking

2.1. The importance of bank regulation

Barth, Caprio Jr, Levine (henceforth Barth et al.) define bank regulation as laws and regulations, based on which banks conduct their operations (Barth et al., 2006). An important element of bank regulation is a bank's supervision, which refers to the continuous inspection that takes place by regulators to ensure that banks comply with those rules (Barth et al., 2006).

The International Competition Network (ICN)⁸ notes that bank regulation is important because of the existence of microeconomic as well as macroeconomic concerns (ICN, 2005). Microeconomic concerns deal with the capabilities of bank creditors or depositors to monitor bank risks. Macroeconomic concerns deal with the capacity of the banking system to remain stable in the case of a banking crisis (ICN, 2005). Apart from statutory regulation, banks fall into the loophole of "informal regulation". This is a case where the government uses its power outside the umbrella of formalized regulation to determine specific outcomes in the banking industry (ICN, 2005). According to the same report by ICN, such outcomes could be a bailout of an insolvent bank, a decision on a bank merger or the preservation of a specific government stake in the bank (ICN, 2005).

Spong argues that the laws and regulations around banking include many aspects, such as who is eligible to open banks, what type of products those banks can offer and the way banks can expand their operations (Spong, 2000). The author identifies four common reasons that serve as explanatory tools for the regulation of banks. These are protection of depositors, monetary

⁸ The international competition network is "a specialized informal network of established and newer agencies, enriched by the participation of non-government advisors (representatives of business, consumer groups, academics, and the legal and economic professions), with the common aim of addressing practical antitrust enforcement and policy issues. By enhancing convergence and cooperation, the International Competition Network promotes more efficient and effective antitrust enforcement worldwide to the benefit of consumers and businesses". See the following document: ICT Factsheet and key messages (2009, April). *The International Competition Network*. <http://www.internationalcompetitionnetwork.org/>. Accessed 16 April 2014. Retrieved from <http://www.internationalcompetitionnetwork.org/uploads/library/doc608.pdf>.

and financial stability, efficiency and competitiveness of the financial system and consumer protection (Spong, 2000).

Furthermore, Spong argues that the need for depositor protection intensified due to the rise in the quantity of money held by businesses and individuals in banks, as well as the boost in the amount of financial transactions made by the public via banks (Spong, 2000). The author refers to two major externalities that banking transmits to customers and creditors. The first is that, through their financial transactions, bank customers simultaneously become bank creditors. This happens because in order to conduct a financial transaction at a bank, one has to hold a deposit account which the bank then uses to provide loans to borrowers. Depositors are creditors to banks because, by creating a deposit account, they can withdraw funds at any time. As a result, their interests are directly related with the bank's interests (Spong, 2000). In other industries, one never has to be simultaneously a creditor and a customer. In general, bank customers have a problem protecting their interests when making transactions with the bank. Spong identifies a second problem which stems from the fact that bank deposits, under the US fractional reserve system of banking, are partially protected by bank reserves in the form of either cash or bank accounts at the Federal Reserve (Spong, 2000). This makes depositor safety contingent on factors such as bank capital, condition and value of loans, securities and other assets. Depositors need to take into consideration each of those factors to ensure the safety of their deposits, however, the procedure of monitoring of the bank's situation is costly, complex and susceptible to error. The aforementioned problems create the need for bank regulation in order to guarantee depositor protection.

Spong also posits that the goal of bank regulation and supervision is to ensure financial and monetary stability (Spong, 2000). The enforcement of the Federal Reserve Act (FRA)⁹ and the Federal Deposit Insurance (FDI)¹⁰ contributed to greater monetary stability. Spong refers to the

⁹The Federal Reserve Act (FRA) is "an act aimed to provide for the establishment of Federal Reserve Banks, to furnish an elastic currency, to afford means of rediscounting commercial paper, to afford a more effective supervision of banking in the United States, and for other purposes". Federal Reserve Act (2013, August 16). Board of Governors of the Federal Reserve System. <http://www.federalreserve.gov/default.htm>. Accessed 17 April 2014. Retrieved from <http://www.federalreserve.gov/aboutthefed/officialtitle.htm>.

¹⁰The Federal Deposit Insurance (FDI) is an "insurance that covers all deposit accounts, including checking and savings accounts, money market deposits accounts and certificates of deposit. The standard insurance amount is \$250,000 per depositor, per insured bank, for each account ownership category". Understanding deposit insurance (2014, March 6). *The Federal Deposit Insurance Corporation*. Accessed 15 March 2015. Retrieved from <http://www.fdic.gov/deposit/deposits/>.

In the euro area, deposit insurance is mainly up to €100,000. See the report titled *JRC Report under Article 12 of Directive 94/19/EC as amended by Directive 2009/14/EC*. The European Commission. <http://ec.europa.eu/>.

fact that banking regulation should encourage practices that lead to strong and liquid banks, and should not support banking practices that are against the safety of depositors and the payments system (Spong, 2000).

The efficiency and competitiveness of banks should also be a major consideration among regulators in the banking industry. Spong argues that a competitive environment promotes the efficient operation of banks and utilization of resources, and enhances innovative advancements in bank services and operations (Spong, 2000). The author notes that competition and efficiency depend on the number of banks operating in the market, the entry barriers in the banking industry and the ability of banks to reach a specific size to conduct their businesses (Spong, 2000). Spong suggests that bank regulation should not put restrictions on the activities of commercial banks and make them uncompetitive relative to other industries, but should get involved in the ability of banks to meet their customer needs, and, finally, should promote the development of a banking system that can follow all economic and technological advancements (Spong, 2000).

Spong suggests that the protection of consumers in their relationship with banks should be another goal of bank regulators (Spong, 2000). This goal has enhanced the development of a wide range of legislative measures for consumer protection. Those are the complete disclosure of credit and deposit terms by the financial institutions to customers, the similar access and treatment of credit to all bank customers, as well the protection of financial privacy and the effective management of problems during credit transactions, debt collections and the reporting of personal credit histories (Spong, 2000).

2.2. A historical overview of the Basel accords

The decade of the seventies has been characterized by several failures in international financial markets¹¹. Several banks bore losses due to foreign exposures. This created a need for a regulatory body, which would be responsible for banking regulation and supervision. In response to that need, the G10 group of governors¹² established a Committee on Banking Regulation and Supervision Practices, which later changed its name to Basel Committee on Banking Supervision (BCBS, 2013). The objective of the BCBS is to ensure financial stability through improving the supervisory knowhow and the quality of banking supervision worldwide¹³. To achieve its goals, the committee uses specific tools such as the imposition of minimum supervisory standards, the development of strategies for the effective supervision of international banking businesses and the exchange of information about national supervisory mechanisms. Direct cooperation with other standard-setting organisations¹⁴ is part of the work of the committee. There are three or four annual meetings of the committee, and its decisions are not binding, which means that they do not have any legal commitment. The committee reports to the central bank of governors and heads of supervision, which is an oversight body of “central bank governors and non-central bank heads of supervision from member countries” (BCBS, 2013, p. 1).

¹¹One failure in the international financial markets was the breakdown of the Bretton Woods system. See the article posted in the IMF website titled The End of the Bretton Woods System (1972-81). *The International Monetary Fund*. <http://www.imf.org/external/>. Accessed 08 April 2015. Retrieved from <http://www.imf.org/external/about/histend.htm>.

Additionally, the collapse of the Franklin National Bank of New York was another instance that caused great damage to the international financial markets. See the article titled Franklin National Bank of New York. *Economic Indicator Services*. <http://www.businesscycles.biz/>. Accessed 08 April 2015. Retrieved from <http://www.businesscycles.biz/docs/franklin.htm>.

¹² The G10 group of governors is a “group of eleven industrialized countries which their aim is to consult and to cooperate on economic, monetary and financial matters”. Those countries are Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States. See G10. *Bank for International Settlements*. <http://www.bis.org/index.htm>. Accessed 29 March 2015. Retrieved from <http://www.bis.org/list/g10publications/index.htm>.

¹³ See the document titled *A Brief History of the Basel Committee* (BCBS, 2013).

¹⁴ Other standard-setting organizations are insurance and securities standard-setting bodies (BCBS, 2013).

2.2.1. Basel I - the first Basel capital accord

The South America debt crisis was a milestone that wreaked havoc on the capital ratios of main international banks¹⁵. Thus, there were substantial concerns among the members of the committee on improving the adequacy of capital ratios on banks, as well as on bringing convergence in the measurement of adequate capital requirements (BCBS, 2013). As a result, an agreement was reached towards a weighted approach in the measurement of risk for both on-balance sheet and off-balance sheet operations.

The objectives for a more stable international banking system as well as a more competitive environment with similar national capital requirements among countries, were additional factors for the creation of a multinational accord. In July 1988, the first Basel Capital Accord (or the 1988 Accord) was released (BCBS, 2013). The accord defined a minimum capital ratio in the range of 8% of capital to risk-weighted assets (RWA)¹⁶. This accord should be applied to member countries and to countries with international banks. Several advancements of the accord took place in the later years (BCBS, 2013).

2.2.2. Towards Basel II

Despite the importance of rules included in the Basel I accord, they proved to be deficient over time. Scepticism has arisen about the weighting of risks, where there was only one category for all corporate and sovereign loans¹⁷. This, as well as other considerations¹⁸ led to the development of a new regulatory framework known as Basel II. This new framework included three pillars. The first pillar (PILLAR 1) attempted to develop standardised rules for minimum

¹⁵ See the report from the Federal Deposit Insurance Corporation (FDIC, 1997). *The LCD Debt Crisis in An Examination of the Banking Crises of the Early 1980s and Early 1990s* (pp. 191-210). Division of Research & Analysis: Vol 1. Accessed 29 April 2015. Retrieved from https://www.fdic.gov/bank/historical/history/191_210.pdf.

¹⁶ Admati & Hellwig note that risk-weighted assets are assets the measurement of which is based on risk-weights. Risk-weights depict the riskiness of different assets. The idea behind this framework is that less risky assets are backed by less equity and vice versa (Admati & Hellwig, 2013).

¹⁷ One Basel Leads to Another (2006, May 18). *The Economist*. Accessed 29 March 2015. Retrieved from <http://www.economist.com/node/6908488>.

¹⁸ In some cases, lenders attempted to decrease their required capital through practices that did not depict a "lower real risk". This process is known as regulatory capital arbitrage. Basel II – questions and answers (2013, January 8). *Council of Mortgage lenders*. Accessed 08 April 2015. Retrieved from <https://www.cml.org.uk/cml/policy/issues/721>.

capital requirements initially described in the 1988 Accord (BCBS, 2013). The second pillar (PILLAR 2) is a regulatory review of the capital adequacy of an institution and its internal assessment process (BCBS, 2013). The third pillar (PILLAR 3) is focused on the effectiveness of the disclosure requirements to enhance good banking practices and to improve market discipline (BCBS, 2013).

However, supervisors faced an important challenge under Basel II. This was that supervisors had to approve the use of certain approaches concerning risk measurement to multiple jurisdictions. The committee replied to those challenges by extending the scope of those approvals and by encouraging greater cooperation between host and home regulators (BCBS, 2013).

2.2.3. Basel III

During the financial crisis of 2008, it became clear that the banking sector was heavily indebted and did not hold adequate liquidity buffers. Additionally, risk management had not received sufficient attention not to mention the complete absence of appropriate incentive structures. The impact of all the above led to an incorrect evaluation of liquidity and credit risks, as well as to a boost in the allocation of credit (BCBS, 2013).

The inability of banks to face the financial crisis of 2008 was a detrimental factor that resulted in attempts for stricter regulation and supervision of banks with international activities¹⁹. Those attempts were realized in mid-December 2010 with the release of new standards under the description “*Basel III: International Framework for Liquidity Risk Measurement, Standards and Monitoring*” (BCBS, 2013). The implementation period for Basel III standards will begin on 1 January 2019. Apart from certain improvements to the three pillars of Basel II, the new accord included additional provisions such as:

- A capital conservation buffer is an additional capital layer above minimum capital requirements, and it is accumulated outside periods of stress. This additional capital layer is to be used in case a bank incurs losses outside stressed periods. When the buffer

¹⁹ It should be noted that the bankruptcy of Lehman brothers happened on September 2008, 9 months after the implementation of the Basel 2 accord, which was on January 2008 (BCBS, 2004). This forced regulators to make revisions to the current standard, and, as a result, they came up with a revised standard, the so-called Basel 2.5 accord, which was implemented on December 2010 (BCBS, 2009).

goes down because a bank has incurred losses, then a bank has to increase it by reducing the distribution of earnings, dividend payments or staff bonus payments (BCBS, 2010).

- A countercyclical capital buffer (CCB) is a buffer of capital aimed to protect the banking system from future losses that can be realized when excess credit growth is directly related with the creation of “system-wide risks”. It should be noted that it is up to the responsibility of national jurisdictions to monitor and assess the level of credit growth and whether it can lead to the creation of a system-wide credit risk (BCBS, 2013). Whether national jurisdictions are the appropriate parties for this job or not, remains to be seen in the future.
- The need for systemically important banks²⁰ to hold higher capital and liquidity ratios (BCBS, 2013).
- A leverage ratio is the ratio between the minimum level of loss-absorbing capital relative to all assets and off-balance sheet exposures of a bank without taking risk-weights into consideration. The committee announced that it will test a minimum Tier-1 leverage ratio of 3% (BCBS, 2013). The leverage ratio must be calculated as an average over the quarter. The purpose of the leverage ratio is to be a complementary non-risk measure to risk based requirements, as well as to reduce the proliferation of leverage in the banking sector and to avoid “destabilizing deleveraging processes”, which endanger both the financial system and the economy (BCBS, 2010, p. 61). The implementation of the leverage ratio will take place in several steps. The monitoring period started in January 2011. The parallel run period will last from January 2013 to January 2017, and, in this period, a 3% leverage ratio will be tested. The final adjustment will be on 1 January 2018.
- Apart from higher capital requirements, the accord includes also liquidity requirements. Liquidity requirements are monitored through two types of liquidity ratios. These ratios are the liquidity coverage ratio and the net stable funding ratio. The liquidity coverage ratio (LCR) aims to provide sufficient cash and liquid assets in order for the bank to meet its funding needs over a 30-day stress period²¹. The liquidity coverage ratio will be introduced on 1 January 2015. The Net Stable Funding Ratio (NSFR) is a minimum

²⁰ Systemically important banks are banks the failure of which can endanger the entire financial system and, as a result, the economy as a whole (BCBS, 2011).

²¹ A 30-day stress period includes “a downgrade of the institutions public credit rating, a partial loss of deposits, a loss of wholesale funding which is not secured, an increase in secured funding haircuts, increase in derivative collateral calls and calls on contractual and non-contractual off-balance sheet exposures” (BCBS, 2010, p. 9).

requirement for stable sources of funds that aim to address maturity mismatches that occur between a bank's assets and liabilities over a period of one year (BCBS, 2013). Moreover, the NSFR aims at a better assessment on all on and off balance sheet items. Additionally, the ratio aims to increase the incentives for banks to use stable sources to finance their operations (BCBS, 2010). In other words, the NSFR represents a minimum acceptable amount of stable funding over a one-year time horizon. The ratio shall ensure that banking inventories, off-balance sheet exposures, securitization pipelines and other assets and activities are funded with at least the minimum amount of stable liabilities in relation to their liquidity risk profiles. The observation period for the Net Stable Funding Ratio (NSFR) will begin in 2012, and the ratio will be introduced on 1 January of 2018.

- Furthermore, the Basel III accord includes additional recommendations for systemically important banks. These recommendations include a higher level of contingent capital²² and improved international supervision and regulation (BCBS, 2013).

The BCBS developed three levels of review in order to ensure the efficient implementation of Basel III. Those levels focus on the timely adoption of Basel III (Level 1), the regulatory consistency (Level 2) and the consistency of outcomes (Level 3) (BCBS, 2013).

The following table presents a timeline of the Basel III phase-in arrangements:

²² Contingent capital is capital set aside under a pre-specified arrangement, in case a specific contingency occurs or a threshold is crossed. An example of contingent capital is the Contingent Convertible Securities (CoCos), which are "hybrid capital securities that absorb losses when the capital of the issuing bank falls below a certain level" (Avdjiev et al., 2013, p. 43).

Basel III phase-in arrangements

(All dates are as of 1 January)



Basel Committee on Banking Supervision

BANK FOR INTERNATIONAL SETTLEMENTS

Phases		2013	2014	2015	2016	2017	2018	2019	
Capital	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.

– transition periods

Table 1. Phase-in arrangements of Basel III Accord (Source: BCBS)

2.3. The importance of systemic risk in the financial sector

The following subchapter discusses the concept of systemic risk and its contribution to the financial crisis of 2007-2009. Moreover, in this subchapter a definition for systemic risk in the context of banking is given. Furthermore, certain mechanisms that lead to the propagation of risks in the financial system are explained. In addition, this section offers a discussion of how exposures due to systemic risk can be effectively faced, and important elements that contributed to the propagation of systemic risk and, as a result, led to the breakdown of the financial system during the crisis of 2007-2009 are explained. Finally, this subchapter closes with certain recommendations about how regulation can effectively mitigate systemic risks. The analysis included in this subchapter is based on literature by Hellwig and by the International Monetary Fund.

Systemic risk is defined as the risk of a breakdown in the financial system which can be caused by the failure of interconnected financial institutions. Therefore, a risk of a breakdown in the financial system creates a risk of a breakdown in the economy (Hellwig, 2012). Taking into consideration the interconnectedness between the financial system and the economy, there is a vicious cycle which transfers risk from the financial system to the economy and vice versa (Hellwig, 2012). It should be noted that, according to the International Monetary Fund, the failure of the financial system is observable *ex post* (IMF, 2009). Apart from the banking sector, systemic risk can exist in many other parts of the financial system such as securities and insurance markets²³. Additionally, systemic risk can either be domestic or international (Hellwig, 2012).

There are four contagion mechanisms which are the product of systemic interconnectedness among financial institutions. The first channel encompasses “domino effects through contractual relations” (Hellwig, 2012, p. 2). In this case, the bankruptcy of one financial institution affects other financial institutions which have claims on the insolvent institution. A second channel comes from “information contagion” (Hellwig, 2012, p. 2). This is a situation where negative information about a financial institution affects the valuation of other institutions with risk profiles similar to that of the distressed financial institution. For instance, the refusal of US government authorities to save Lehman Brothers via a bailout made investors uncertain about the possibility of bailouts for other distressed banks by the government (Hellwig, 2012). A reduction in banks’ wholesale funding²⁴ and a failure of interbank markets were the results of investor reactions to the refusal of bailout of Lehman Brothers (Hellwig, 2012). Information contagion is mostly based on recent information about the financial institutions under examination. Domino effects can also be caused through markets and prices (Hellwig, 2012). Hellwig argues that this is a situation where a troubled financial institution in need for cash sells assets at distressed market prices in order to reduce its leverage (Hellwig, 2012). This has a negative externality to other financial intermediaries, which have claims on those assets and which need to write down losses on their trading books. The resulted write-downs will substantially reduce the equity of the affected financial institutions and cause them

²³ A recent article by Daniel and Steven Schwarcz shows that there are substantial correlations among insurance companies. By taking their interconnectedness with the financial system into consideration, as well as their vulnerabilities to fail, this creates systemic risk which regulators need to manage (Schwarcz, D & S., 2014).

²⁴ Wholesale funding refers to short-term funds that banks borrow from other financial institutions to finance their operations. Wholesale Funding. *QFINANCE*. Accessed 08 April 2015. Retrieved from <http://www.financepractitioner.com/dictionary/wholesale-funding>.

to sell assets in order to align with regulatory requirements or respond to investors' pressure. "The breakdown of trading infrastructures" is the fourth channel of contagion (Hellwig, 2012, p. 3). The failure of a financial institution operating as a market maker²⁵ leaves other financial institutions prone to risks that they were supposed to manage through contracts with the failed market maker. Additionally, a freeze in the markets can also lead to the failure of trading services. The uncertainty about the valuation of mortgage-backed securities and other derivatives in August 2007 induced the failure of the markets where those securities were traded and, as a result, caused extreme liquidity risks for financial institutions in possession of those securities (Hellwig, 2012).

There is a wide range of issues that come up when dealing with exposures arising from systemic risk. Hellwig identifies two major sources that enhance systemic risk exposures (Hellwig, 2012). Systemic risk exposures can arise due to parallel exposures of many financial institutions to shocks in macro-economy and also because the system can be sensitive to the proliferation of shocks and contagions. It should be noted that there are different methodologies for identifying and handling systemic risk, but the explanation of those lies beyond the scope of this Master Thesis.

An appropriate solution for evaluating and limiting the effects of systemic risk should be based on efforts to limit the exposures of the whole system and not only the exposures of the individual institutions. An attempt to reduce "systemic risk exposures" by limiting only the exposures of an individual institution is "insufficient and counterproductive"²⁶ (Hellwig, 2012). The focus of the system should be on how to better assess exposures caused by systemic risks (Hellwig, 2012). However, the assessment of those exposures should not only be based on risks stemming from macroeconomic factors, which are in the banks' books, but also on counterparties which transfer risks outside banks' balance sheets (Hellwig, 2012). How regulators can effectively deal with these counterparties remains a puzzle. A more transparent environment about every market participant in the financial system could be a possible solution (Hellwig, 2012).

²⁵ A market maker is mainly a broker dealer firm that engages in buy and sell activities in order to facilitate trading. See Market Maker. *U.S Securities and Exchange Commission*. <http://www.sec.gov/index.htm>. Accessed 29 March 2015. Retrieved from <http://www.sec.gov/answers/mktmaker.htm>.

²⁶ Hellwig argues that, when shock expansion through the system enlarges the overall exposure, then it is not sufficient for regulators to examine and reduce systemic risk by focusing on the individual risks of each institution. This approach is also counterproductive because it leads to imperfect hedges that were supposed to be perfect (Hellwig, 2012). Counterparty risk is the risk of default of a counterparty in a derivatives contract (Gregory, 2010).

Hellwig argues that the recent financial crisis of 2007-2008 revealed many issues that led to the realization of systemic risk (Hellwig, 2008). More specifically, the author identifies two basic elements that contributed to the propagation of systemic risk in the crisis. The first element was excessive reliance on maturity transformation²⁷ by Special Purpose Vehicles (SPV) during the crisis. The second mechanism that contributed to the propagation of systemic risk during the crisis was mainly attributed to market malfunctioning, fair value accounting and to a banking sector which had insufficient capital to cover its losses (Hellwig, 2008).

Maturity transformation is considered to be a risky process for financial intermediaries that are reliant on refinancing mechanisms to finance their issuance of short-term debt (Hellwig, 2008). As mentioned before, SPVs were particularly reliant on maturity transformation because they heavily relied on short-term funding through issuing short-term securities to finance their long-term assets (Hellwig, 2008). The fact that SPVs issued short-term securities to finance long term assets made them dependent on constant short-term funding (Hellwig, 2008). If SPVs cannot finance themselves through issuing short-term securities, then systemic risks arise (Hellwig, 2008). Hellwig argues that, if SPVs cannot find other sources of refinancing, then they have to turn to a fire sale of their long-term assets which subsequently depresses the prices of those assets (Hellwig, 2008). These price declines have a negative impact on all other institutions with claims on those assets (Hellwig, 2008). Based on mark-to-market accounting, this downward pressure on asset prices should be recognized immediately by other institutions as losses in their books (Hellwig, 2008). If market participants know that other institutions are in possession of those assets, this has a negative impact on their trust, and, as a consequence, it motivates them to withdraw their financing from the affected institutions (Hellwig, 2008).

Market malfunctioning has substantially contributed to the propagation of systemic risk during the financial crisis. Before the crisis, markets failed to provide the right signals in time to investors who invested in securities issued by SPVs about the quality of the underlying assets of those securities. To make matters clear, Hellwig estimates that “an equilibrium between market values of MBS and discounted present values of future cash flows from mortgage borrowers or their properties can exist when one would expect property values to decline by 45-50%” (Hellwig, 2008, p. 40). “However, data show that the average decline in property values was 19%” (Hellwig, 2008, p. 40).

²⁷ Maturity transformation is the process of borrowing short-term to finance long-term assets (Pozar, 2010).

Developments in accounting mechanisms had a strong impact on the propagation of systemic risks due to the fact that they made financial institutions more interconnected than ever before. Considerations arise when a financial institution wants to hold assets until maturity and is reliant on fair-value accounting²⁸. In a crisis situation where markets do not function perfectly, there is a possibility that the “market value of a security can be below the expected present value of its future cash flows” (Hellwig, 2008, p. 44). Under the regime of fair-value accounting, banks should recognize a loss immediately (Hellwig, 2008).

Hellwig argues that there should be a different treatment in the valuation of assets held in banks’ balance sheets (Hellwig, 2008). More specifically, there should be a different valuation treatment for assets held to maturity and for assets destined to be liquidated immediately. Hellwig refers to the situation where, under imperfect functioning of markets, “market values of assets are below the expected present values of future cash flows” (Hellwig, 2008, p. 43). The author supports the view that, in such a case, banks must recognize losses immediately, take corrective action which will dilute their equity and will lead to a fire sale of assets to reduce their leverage. Such fire sales of assets would have dire consequences on asset prices and on the function of the financial system (Hellwig, 2008).

A third cause of the propagation of systemic risk during the crisis was that financial institutions did not hold sufficient capital buffers²⁹ to absorb large losses (Hellwig, 2008). This insufficiency of capital buffers is demonstrated, initially, by the SBS³⁰, which did not hold any equity at all. More specifically, Hellwig notes that SIVs during the financial crisis of August/September 2008 were not sufficiently capitalized to absorb the losses incurred (Hellwig, 2008). Additionally, a strategy undertaken by the banking industry to expand its businesses without adjusting its capital base³¹ also led to the inefficiency of equity buffers. A banking system operating with reduced equity capital is more vulnerable to unpredictable

²⁸ The system of fair value accounting is a system of asset valuations based on market prices. In banking, this means that financial institutions should value the assets they hold at prices which enable them to sell those assets immediately. If markets for those assets do not exist, then securities with similar characteristics are used to determine markets prices. In case that the markets for those securities are not functioning, then market prices are estimated based on econometric models (Hellwig, 2008).

²⁹ Hellwig defines a capital buffer as excess capital being higher than the regulatory capital requirements (Hellwig, 2008).

³⁰ Conduits and Special Investment Vehicles (SIV) or Special Purpose Vehicles (SPV) are parts of the Shadow Banking System (SBS). The importance of the SBS will be discussed in subchapter 2.4 of this Master Thesis.

³¹ Hellwig defines this strategic choice as “economizing” on equity. In principle, banks’ equity capital was subsequently reduced under the support of statutory rules for prudential regulation, and those reductions corresponded both to capital buffers and minimum capital requirements (Hellwig, 2008, p. 44).

shocks. Hellwig argues that there are two issues that arise when banks are undercapitalized. Firstly, a banking system operating at reduced capital buffers is less flexible to react appropriately to a shock and therefore has to “take corrective actions” (Hellwig, 2008, p. 44). Secondly, solvency rumours arise when banks operate with less capital (Hellwig, 2008).

The Global Financial Stability Report (GFSR) on April 2010 (IMF, 2010) presented 3 considerations in order to mitigate systemic risk in the financial system. Initially, regulators need to consider the imposition of “systemic risk-based capital-surcharges” (IMF, 2010, p. 23) i.e. additional charges on capital of a financial institution based on the risks that it can pose to other financial institutions³². Along with the imposition of “systemic risk-based capital-surcharges” further recommendations are the imposition of taxes on financial institutions based on the risks they impose to the system and the limitation of their business activities (IMF, 2010).

2.4. The shadow banking system

This section of the chapter includes a description of an innovative feature of the banking sector which is defined according to The Economist Paul McCulley as the *shadow banking system* (The Economist, 2014). This section introduces a definition for shadow banking and provides evidence about its size and development. Additionally, this section discusses the reasons why the SBS evolved so rapidly during the last years and what makes it special compared to the traditional banking system that we already know. Furthermore, basic elements of the SBS are also going to be explained. An analysis of the interconnectedness between the SBS and the traditional banking system is crucial in this part. Lastly, arguments mostly from the academic environment about the regulation of the SBS are going to be provided. The analysis is mostly based on academic literature (Gorton, 2009; Pozsar et al., 2010; Gorton & Metrick , 2010; Schwarcz , 2012; Stanley , 2013) as well as from a special report conducted by the newspaper

³² There are two approaches in order to estimate capital surcharges based on the risks that a distressed financial institution could impose on other financial institutions. Those are the standardized-approach and the risk-budgeting approach or internal-models based approach. In the standardized approach, capital surcharges are determined based on systemic risk ratings, which are attributed to each financial institution. In this approach, there are different systemic risk categories, and, for each category, there is a predetermined capital surcharge. In the risk-budgeting approach, capital surcharges are determined based on the institution's probability of default and its incremental value-at-risk (IMF, 2010). According to the International Monetary Fund (IMF), incremental value-at-risk is the increase in the amount of losses incurred in the financial system from an institution's default (IMF, 2010).

The Economist on May 2014, the Global Shadow Banking monitoring report of the Financial Stability Board (FSB, 2013), the FSB Report (FSB, 2011) “Shadow Banking: Strengthening Oversight and Regulation”, a paper on Shadow Banking in the Euro area from the European Central Bank (ECB) (ECB, 2012) and a study of the Federal Reserve Bank of Saint Louis (Noeth & Sengupta, 2011)³³.

According to the governor of the Financial Stability Board (FSB, 2012)³⁴, the SBS constitutes a threat to the global economy. SBS is defined as a system of credit intermediaries that perform similar functions as those of a bank but which are subject to a more relaxed regulatory environment than that applied on banks (Noeth & Sengupta, 2011). The main activities of the SBS include credit, maturity and liquidity transformation³⁵ (Pozsar et al., 2010). The most important feature of the SBS is that it is not subject to any central bank liquidity or public sector credit guarantees (Pozsar et al., 2010).

The ECB report on shadow banking refers to the fact that the Basel III Accord, having introduced increased capital requirements for banks as well as liquidity requirements, created a situation that made credit intermediation expensive and, as a result, it induced banks to transfer part of their activities outside their balance sheets and thus enabled the creation of the SBS (ECB, 2012). Additionally, those regulatory pressures to banks have made loan issuance too difficult to be executed and, as a result, many firms faced extreme difficulties in borrowing from banks despite their good credit histories³⁶. This led them to seek other funding sources outside the regulated sector. Similar regulatory restrictions have been placed on banks’ payment systems through the reduction of banks’ charges on both credit- and debit-card payments. Schwarcz argues that the development of the SBS was due to technology and, more specifically,

³³Noeth, J., Sengupta, R., (2011, October). Is Shadow Banking Really Banking? *The Regional Economist*. Federal Reserve Bank of Saint Louis. Accessed 8 April 2015. Retrieved from <https://www.stlouisfed.org/publications/regional-economist/october-2011/is-shadow-banking-really-banking>.

³⁴ The Financial Stability Board is an international regulator which is responsible for the protection of the economy against the possibility of future crises. See the article: Shadow Banking. The Lure of Shadow Banking (2014, May 10). *The Economist*. Accessed 08 April 2015. Retrieved from <http://www.economist.com/news/leaders/21601826-shadow-banks-helped-cause-financial-crisis-better-regulated-they-could-help-avert-next>.

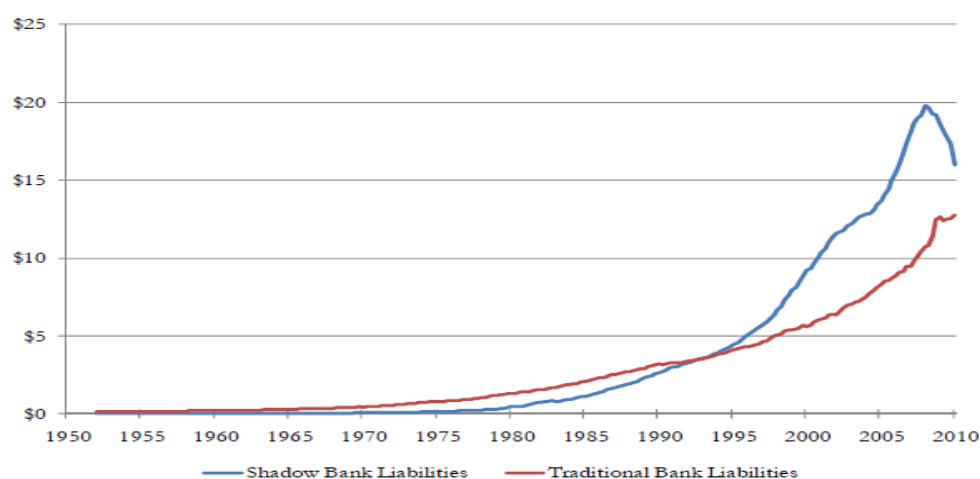
³⁵ Credit transformation is a way to determine the credit quality of debt via the use of priority of claims. For instance, the credit quality of deposit accounts is better than the credit quality of a loan portfolio. Liquidity transformation is the use of liquid securities to finance illiquid assets (Pozsar, 2010).

³⁶ A very good example of specific UK firms that found difficulties to borrow from banks in the UK is provided in a 14-page report about shadow banking conducted by the magazine *The Economist*. See Shadow and Substance. Special Report on International Banking (2014, May 10). *The Economist*. Accessed 08 April 2015. Retrieved from http://www.economist.com/sites/default/files/20140510_international_banking.pdf.

to the creation of innovative financial products at a relatively lower cost in comparison to traditional banks. Additionally, regulatory arbitrage contributed to the growth of shadow banking (Schwarcz, 2011).

The FSB refers to the fact that the SBS has grown in the last years substantially, reaching \$71 trillion at the beginning of 2013 (FSB, 2013). The US has the largest share in the SBS, being almost equal in size to the traditional banking system as of 2011. In the Euro area, the SBS is approximately half the size of the traditional banking system (ECB, 2012). Alarming growth of the SBS is observed in emerging economies³⁷. Shadow banks experienced a substantial growth till the run up to the financial crisis, where afterwards they declined in size. For a better understanding of the growth of the SBS, a figure by the Federal Reserve Board (FRB) and the Federal Reserve Bank of New York (FRBNY) comparing the liabilities of the SBS to those of the traditional banking system is presented below.

Figure 1: Shadow Bank Liabilities vs. Traditional Bank Liabilities, \$ trillion⁴



Source: Flow of Funds Accounts of the United States as of 2010:Q1 (FRB) and FRBNY.

Figure 1. The growth of shadow bank liabilities compared to traditional bank liabilities (Source: Flow of Funds Accounts of the United States as of 2010:Q1 FRB and FRBNY)

As noted earlier, increased competition in the banking system in both the assets and liabilities sides of the balance sheet has decreased the profits of the banking system substantially and enabled banking system's quest for new profitable opportunities (The Economist, 2014). The

³⁷See Shadow Banking in China. Battling the Darkness (2014, May 10). *The Economist*. Accessed 29 March 2015. Retrieved from <http://www.economist.com/news/finance-and-economics/21601872-every-time-regulators-curb-one-form-non-bank-lending-another-begins>.

popularity of the SBS was enhanced mainly by the creation of off-balance sheet vehicles, which were separate from banks, but were extremely dependent on them. The assets held by those entities were loans being transformed into securities through a process called *securitization* and sold to investors (Noeth & Sengupta, 2011). However, those instruments had substantial risks and lower value, a fact that was not noticed by investors. The tasks of those entities were mainly to expand credit and spread risks where those attributes gave them the advantage to hold substantially low levels of capital and were not included in the banks' liabilities. Money market mutual funds (MMMF), Peer-to-peer lending, private equity firms, Over-the-counter contracts (OTC) and repo transactions are considered parts of shadow banking that were developed substantially due to the stricter regulatory environment on regulated banks (The Economist, 2014). This subchapter discusses briefly important parts of the SBS such Money market mutual funds (MMMFs), repos and securitization, as they played a significant role during the financial crisis.

The MMMFs are mainly pools of funds that come from different investors and are invested in high-quality short term government and commercial paper. For the funds put in MMMFs, an investor receives investment shares that can be withdrawn on demand. An important characteristic of those shares is that they have a stable value of \$1 per share (Gorton & Metrick, 2010).

A repo, also known as a sales and repurchase agreement, is a transaction in which a cash borrower receives short-term cash in the form of a loan from a cash lender, who, in exchange, receives securities as collateral on the loan for a specific period of time and under a specific amount of cash (Gorton & Metrick, 2010). The cash borrower pays interest to the cash lender on the amount borrowed over the duration of the loan which is called the repo rate (Gorton & Metrick, 2010). A very important characteristic of the repo transaction is that, in the event of default, the lender / creditor is not subject to the automatic stay rule³⁸, which gives him the right to sell the security to the capital markets and receive the proceeds. Usually the amount deposited was less than the value of pledged collateral; this difference is called a *haircut*. The amount of

³⁸ According to US bankruptcy law, the automatic stay rule is an order that halts any actions from creditors to "grab" any asset from a company which has filed for bankruptcy. See Automatic Stay. In <http://www.uscourts.gov/Home.aspx>. Accessed 29 March 2015. Retrieved from <http://www.uscourts.gov/FederalCourts/Bankruptcy/BankruptcyBasics/Glossary.aspx>.

a haircut is dependent on the credit quality of the underlying instrument (Gorton & Metrick, 2010).

An additional mechanism that led to the development of the SBS is securitization. Securitization is a process of converting loans into tradable securities. The process begins with the origination of a wide range of loan types from regulated and unregulated financial entities that are sold to another bank, which is formally called a warehousing bank (Noeth & Sengupta, 2011). The warehousing bank purchases the loans from one or more originators and pools them (Noeth & Sengupta, 2011). Subsequently, the pooled loans are sold to a subsidiary of a large commercial and investment bank named the administrator (Noeth & Sengupta, 2011). The purpose of the administrator is to transfer the loans into a Special Purpose Vehicle (SPV) which the administrator creates (Noeth & Sengupta, 2011). The SPV holds the loans and finances them by issuing securities. The securities are then rated by rating agencies with the purpose of increasing their marketability. Finally, the securities are sold with the help of an underwriter, typically an investment bank, that sells the securities to investors and collects the proceeds. The whole process of securitization is depicted in the following diagram.

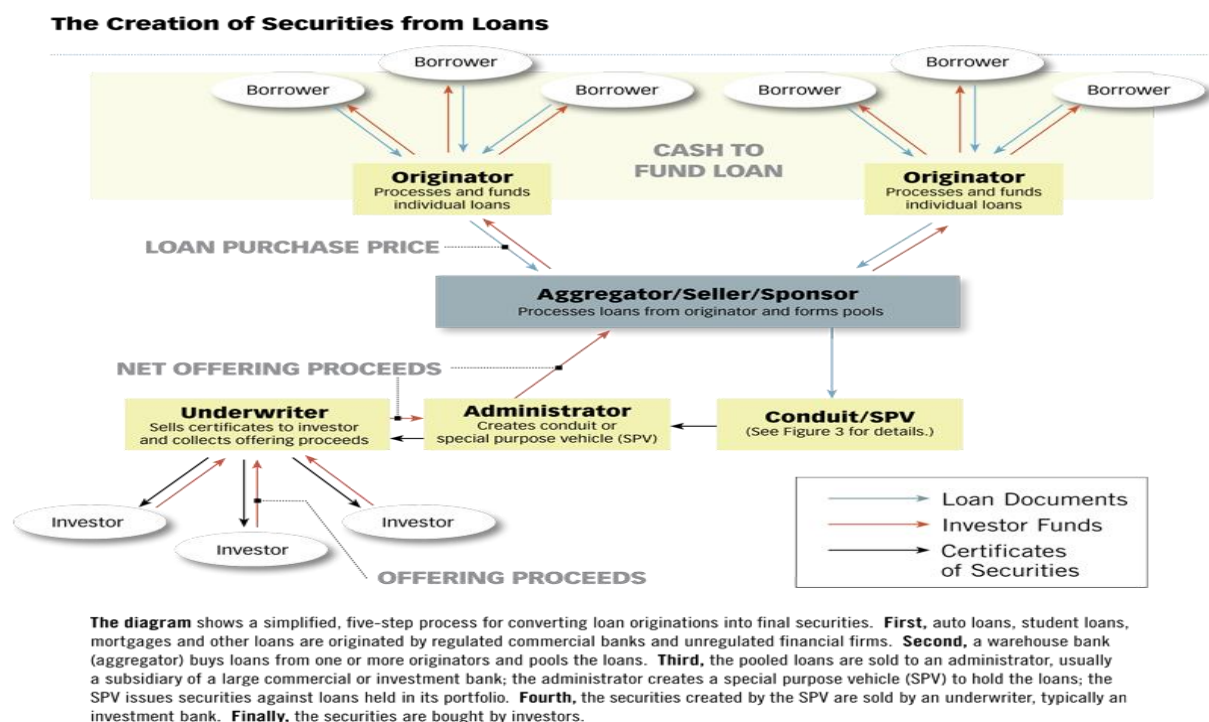


Diagram 1. The securitization process (Source: Noeth & Sengupta, 2011)

Gorton & Metrick argue that there are many reasons why a financial intermediary may choose to move part of its assets off its balance sheet through securitization. Major reasons are

“bankruptcy, taxes, adverse selection, moral hazard, regulatory costs, transparency and customization” (Gorton & Metrick, 2010, pp. 272-275).

Through securitization, the SBS has brought a lot of benefits to the financial system. Stanley argues that securitization enables the diversification of risks among borrowers (Stanley, 2013). Moreover, the author believes that, by incorporating different tasks of credit intermediation, it enables economies of scale and scope and thereby reduces costs. Additionally, securitization provides a wide range of securities to have different risk and maturity (Stanley, 2013). That enables financial institutions to better construct portfolios based on their preferences compared to traditional banking. Another benefit of shadow banking via securitization is that it increases transparency through the sale of assets which in any other case would be hidden in opaque balance sheets of traditional banks (Stanely, 2013). Moreover, shadow banking practitioners argue that the possibility of cascading defaults arising from shadow banking is very limited relative to those that can arise from traditional banking due to the fact that, in shadow banking, there are restrictions on how much shadow banks can leverage their investments (The Economist, 2014). However, the academic environment argues that some types of highly leveraged shadow banks can enhance “financial fragility” (Stanley, 2013, p. 4). Another drawback of shadow banking is that, through its complexity of credit intermediation, it creates an environment where deception and exploitation prevails (Stanley, 2013). This means that investors who hold securities issued by an SPV do not understand the extent of risks inherent in those securities and they believe that those securities are safe based on rating agencies’ evaluations. As proved to be the case during the financial crisis of 2008, the risks were much higher than estimated and investors were deceived by the rating agencies’ credit valuation of the securities they held.

During the recent financial crisis, the SBS has played a major role in a way that was highly interconnected with the traditional banking system (FSB, 2011). There are many ways through which the traditional banking system was highly interconnected with that of the SBS. Firstly, traditional banks were part of the shadow banking credit intermediation process or offered support to shadow banks through guarantees in order to infuse them with cheap money and enable the process of maturity or liquidity transformation (FSB, 2011). Secondly, there was an exchange of funds between traditional banks and shadow banks via loans and investments in financial products (FSB, 2011). Lastly, there were many cases where banks were the direct owners of shadow banks (FSB, 2011). By considering the extreme interconnectedness between the traditional banking system and the SBS, one can infer that this strong interdependence can

be a source of systemic risk, as financial difficulties in one entity can spill over to the other (FSB, 2012). Additionally, “when two entities invest in similar or correlated assets or sectors, this enables the pro-cyclical increase of leverage, which subsequently increases the risk of asset price bubbles” (FSB, 2011, p. 20). It can also be the case that, both banks and shadow banks, which invest in the same sectors or financial instruments, have common exposures and thus enable the build-up of systemic risks (FSB, 2011).

The FSB identifies two useful measures for evaluating the potential risks that come from the interconnectedness between traditional banking and shadow banking entities (FSB, 2012). These are “direct credit exposures” and “funding dependence” (FSB, 2012, p. 20). Credit and funding risk between banks and shadow banks depend on the “size and maturity structures of assets and liabilities in their balance sheets, concentration levels by subsector and type of collateralization, in case it exists, of lending instruments” (FSB, 2012, p.20).

The regulation of the SBS should be based on the argument that it is complementary to and not a substitute of the traditional banking system (Gorton, 2009; Noeth & Sengupta, 2011). The SBS resulted in a lot of benefits for the financial system as a whole, and future regulation should focus on the question of how to take advantage of those benefits without imposing panic through systemic risks. A first step towards the regulation of the SBS is the recognition of two types of demand: the demand for collateral by firms and the demand from firms to save cash temporarily and safely (Gorton & Metrick, 2010). A second step towards the regulation of the SBS is to allow it create a “charter value” and “information-insensitive debt”³⁹. According to the authors, a number of steps need to be taken in order to allow shadow banks to create a “charter value” and “information insensitive debt” (Gorton & Metrick, 2010). Firstly, the government should provide insurance of senior tranches of securitization of approved asset classes. Secondly, the government should examine banks’ choices of asset class, portfolio and tranching in securitization. Thirdly, the government should ensure that securitization is only conducted by banks and if anyone enters the business it should automatically undergo supervision. Schwarcz argues that regulation should be focused on 2 areas, which are the maximization of economic efficiency of the SBS and the minimization of its systemic risks (Schwarcz, 2012). The maximization of economic efficiency requires the correction of 4 types of market failures which are: “information failure, rationality failure, principal-agent failure

³⁹ Information-insensitive debt is a “debt instrument for which the cost of producing private information about its payoff is not worth bearing by potentially informed traders” (Gorton & Metrick, 2010, p. 267).

and incentive failure” (Schwarcz, 2012, pp. 631-632). On the other hand, limits imposed on regulatory arbitrage might be a solution for minimizing systemic risks of shadow banking. This can be achieved through either more relaxed regulation of traditional banks or more strict regulation of shadow banks (Schwarcz, 2012). Actions towards a stricter regulatory environment for shadow banks have already been taken in some regions⁴⁰. However, there is still the challenge of how regulation can lessen the risk of systemic harm and simultaneously preserve the efficiency of shadow banking.

Regarding the regulation of MMMFs, Securitization and Repos, Gorton & Metrick make 3 proposals (Gorton & Metrick, 2010). For MMMFs, the authors propose a reorganization into “narrow funding banks”, which would hold all the properties that MMMFs have but would be subject to prudential regulation and supervision. For securitization, Gorton & Metrick suggest the creation of “Narrow Funding Banks” (henceforth NFB) (Gorton & Metrick, 2010, p. 284). These would be regulated banks, which would have the monopolistic advantage to hold securitized products and can purchase high-quality assets. Additionally, there would be a regulator for those entities that would be responsible to determine the criteria of NFBs’ portfolios (Gorton & Metrick, 2010, p. 285). The regulation of repos is focused on appropriate licences for non-bank entities engaging in repo transactions, eligible collateral for those entities and minimum haircuts on collateral used (Gorton & Metrick, 2010). The proposals by Gorton & Metrick were a subject of extreme criticism by the academic community⁴¹. Additionally, The Economist proposes that some forms of shadow banking which were responsible for the crisis should be prevented (The Economist, 2014). Shadow banks should not rely too much on borrowing from traditional banks, since this behaviour might infect the banking system. Finally, this Master Thesis posits that the regulation of the SBS will be a major topic on the regulatory agenda in the coming years.

⁴⁰ Schwarcz notes that “The Dodd-Frank Act in the US has already taken actions towards the regulation of shadow banks though imposing capital requirements, leverage limits, limits on short-term debt, liquidity requirements and increased regulatory disclosures” (Schwarcz, 2012, p. 639).

⁴¹ Schleifer points out that the fundamental risk of the financial crisis was not the run on repo which Gorton and Metrick support in their paper, but the fact that market participants and regulators misunderstood the risks inherent in asset-backed securities (hereinafter ABSs) and other types of financial instruments they purchased. The author points out that, in environments where risks are not appropriately evaluated, the regulation of a particular instrument would not work because market participants would pursue profits elsewhere (Gorton & Metrick, 2010). Virulo argues that the monopolistic purchase of ABSs by NFBs as proposed by Gorton & Metrick would lead to restrictions in the securitization of all ABSs (Gorton & Metrick, 2010).

Chapter 3. Arguments in favour of increased capital requirements

3.1. Defining capital regulation

The banking system entered the crisis with too little capital in its balance sheet⁴². A noteworthy example is offered by the magazine *The Economist* which states that the “Royal Bank of Scotland, for instance, needed a huge bailout not because its losses were so large but because it entered the crisis with a dangerously thin capital cushion of only about 3.5%”⁴³. This example describes an environment where the banking system was completely unprepared for a crisis event. In December 2009, the Basel Committee took substantial measures to strengthen the banking system (BCBS, 2009). However, Hellwig argues that the Basel Committee’s proposals lacked any systemic analysis of the reasons why the proposed measures should bring about the desired results, as well as the reasons why the existing system of capital regulation didn’t meet the requirements of the crisis (Hellwig, 2010).

Before focusing on the arguments towards increased capital requirements, this chapter of the Master Thesis will discuss the definition of capital and the objectives of capital regulation. Admati et al. (2011) define capital as a medium through which banks receive funds or as “the mixture of debt and equity on the banks’ balance sheets” (Admati et al., 2011, p. i). It is important to note that capital is often confused with liquidity (Admati. et. al., 2011).

The objective of capital regulation is to maintain the safety and soundness of the banking system (Hellwig, 2010). Hellwig defines three ways through which capital contributes to the safety and soundness of banks (Hellwig, 2010). Firstly, capital plays the role of a buffer against

⁴² The BCBS states that banks’ undercapitalization before the crisis played a substantial role during the crisis. (BCBS, 2009).

⁴³ See the article: Capital. How Much is Enough? (2011, May 12). *The Economist*. Accessed 29 March 2015. Retrieved from <http://www.economist.com/node/18654640>.

unexpected losses. Secondly, capital reduces the risk that can be borne by creditors or taxpayers. Lastly, capital gives the regulator more time to intervene before the bank enters insolvency. It is noteworthy to point out that there are different calibration methods depending on the role that capital serves. Hellwig refers to the fact that, if capital is used as a buffer against unexpected losses, then it should be mapped based on total risk (Hellwig, 2010). Additionally, when capital serves as an incentive, then it should be mapped relative to the incremental risks that stem from additional assets. Finally, when capital is used as a mechanism of intervention before a bank is insolvent, then it should be calibrated based on the disposability of assets at the time of intervention.

Hellwig identifies two conceptual flaws regarding the role that capital regulation plays (Hellwig, 2010). The first conceptual flaw refers to the way capital regulation should be implemented in an environment with ongoing financing and investment decisions. More specifically, the author raises questions about what the adjustment of banks' assets and liabilities would be given the situation where bank capital is completely absorbed. A second consideration of the author is that capital regulation does not take into account its systemic developments. He points out 3 areas that give rise to systemic concerns. Firstly, when calibrating the risk of regulatory capital, there is not much emphasis on the effects of counterparty credit risk and market risk on systemic risks. Secondly, the imposition of regulation on fire sale assets can lead to systemic developments. Lastly, the author states that the model-based approach enhances the interconnectedness of the system by encouraging banks to include derivative transactions into their books (Hellwig, 2010). Additionally, the model-based approach increased the vulnerability of the system by enabling banks to favourably classify their assets into risk categories where capital requirements in those categories were low. An example offered by the author is that a substantial amount of assets held by banks has been put into trading books instead of being put into credit books due to the fact that, under the model-based approach, capital requirements for market risks were lower than those for credit risks (Hellwig, 2010). In the case of a substantial change in asset prices due to deleveraging effects or market malfunctioning, this can have a substantial impact on banks' trading books, which can consequently affect their capital (Hellwig, 2010).

Hellwig stresses that banking regulation needs a major transformation in order to render the whole system safer. He identifies two major changes towards that direction (Hellwig, 2010). The first proposal is that the calibration of regulatory capital should not be based on the risk that banks take. The reason for this is that the idea of risk calibration is responsible for the

decline in banks' capital ratios and for the rise in systemic risk⁴⁴. The second proposal, which forms the core of this Master Thesis, is that the whole system of bank regulation should focus on raising capital requirements above the proposed levels of Basel III. More specifically, Hellwig believes that regulatory capital should approach a level between 20% and 30% of total assets, which was the level that banks were used to before the implementation of deposit insurance lender of last resort (LOLR) schemes (Hellwig, 2010). The following part of this chapter discusses the vital arguments in favour of higher capital requirements.

3.2. Main arguments towards increasing bank capital requirements

This subchapter examines the main arguments for higher capital requirements. The main arguments being expressed by various authors are presented in the book by Anat Admati and Martin Hellwig titled *The Bankers' New Clothes: What's Wrong with Banking and What to Do about it* (Admati & Hellwig, 2013) as well as in the paper by Admati et al. titled *Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is not Expensive* (Admati et al., 2011).

The new book by Anat Admati and Martin Hellwig, *The Bankers' New Clothes: What's Wrong with Banking and What to Do about it*, has raised important considerations regarding capital regulation. It is noteworthy to point out that the academic society has compared the book with Keynes' general theory⁴⁵. The main message of the book is that banks need to raise their equity requirements substantially above the proposed levels of Basel III. The authors characterize opposing arguments based on the idea that "equity is expensive" as flawed, irrelevant and based on myths. Conversely, the authors argue that higher equity requirements do not entail any costs for society (Admati & Hellwig, 2013).

⁴⁴ Hellwig argues that the ability of banks to adjust their capital requirements based on the risk they recognize, incentivized them to transfer risks outside of their books via entering into derivative contracts with other banks. As a result, the interconnectedness of the system was intensified. Additionally, by entering into those derivative contracts, banks failed to identify hidden risks which they later found difficult to remove from their books (Hellwig, 2010).

⁴⁵ This idea is expressed by Myerson (Myerson, 2014).

In the banking world, capital is mainly another name for equity (Myerson, 2014). Equity refers to the proportion of bank investments that is attributable to bank owners. In other words, equity is the difference between a bank's assets or investments and its liabilities to depositors and creditors.

Admati et al. argue that the levels of equity in banks at the beginning of the twentieth century were substantially higher than the current levels (Admati et al., 2011). In those times, it was the norm for banks to have equity levels around 25 percent of their total assets. In other words, the share of a bank's owners in the bank's losses was substantially higher than the current levels. Given a strong decline in banks assets, the first to pay were equity holders and then creditors. Given the high levels of equity that existed in those times, it was highly probable that debt holders would collect all of their claims. Otherwise, debt holders would not be willing to extend loans to a bank with very weak capital levels at low interest rates and, as a result, they would require higher interest rates for those banks. In a remarkable article, Andrew Haldane⁴⁶ points out that the banking business was much simpler in the first half of the 19th century, when there were around 500 banks that operated as unlimited liability partnerships (Haldane, 2012). In an unlimited liability partnership, the owners and managers support fully bank losses on an unlimited basis. Additionally, the assets in the financial sector of the UK during that period were 50% of the country's GDP (Gross Domestic Product). The 19th-century banking model provided numerous benefits that contributed to a better management of the risk-taking of banks. Firstly, the large volumes of shareholders' capital protected depositors from losses. Secondly, banks held large amounts - almost one third - of their assets in cash and liquid securities, which enabled them to fulfil their obligations to depositors. Thirdly, there were no disparities between banking systems in the UK and in Europe. Fourthly, thanks to unlimited liability, shareholders monitored bank management effectively and vice versa. In such a banking environment, there were no concerns among depositors regarding the bank's ability to repay them (Haldane, 2012).

Supporters of higher capital requirements in banking argue that, with more equity, there is a smaller probability that losses from banks' investments will affect depositors and creditors, since bank capital buffers will immediately absorb any losses from such investments (Myerson, 2014). Diamond and Rajan argue that the safety of banks increases when banks possess more

⁴⁶ Andrew Haldane is Executive Director of Financial Stability at the Bank of England. In his article titled *The Doom Loop*, the author focuses on bank equity and the banking system. Haldane, A. (2012). *The Doom Loop*. London Review of Books, Vol. 34 (4), pp. 21-22. Accessed 09 April 2015. Retrieved from <http://www.lrb.co.uk/v34/n04/andrew-haldane/the-doom-loop>.

capital (Diamond & Rajan, 1999). Moreover, owners of a bank with more equity have an incentive to better control bank risks in order to avoid the occurrence of large losses connected with those risks. If equity levels increase and the owners' contributions increase as a result, then the owners will have an incentive to monitor the risk of bank activities. On the other hand, when bank managers are monitored by owners, they make more prudent investment decisions because otherwise they face the risk of being fired. As a result, increased equity requirements are considered as an effective solution of the moral hazard problem in banking (Myerson, 2014).

Additionally, concerns from other financial institutions regarding a bank's exposures when it is close to financial distress may freeze the short-term funding that those institutions provide to the financially distressed banks. Admati et al. argue that increased capital requirements would result in greater confidence between financial institutions (Admati et al., 2011).

The recent financial crisis has highlighted the significance of systemic risk in the banking environment. If a financial institution is in financial distress, this could easily spread to other financial institutions and to the rest of the economy. Admati et al. argue that it would be a social benefit if there was a reduction in the impact of systemic risk coming from troubled financial institutions by lowering the risk of those institutions which are financially distressed (Admati et al., 2011). The authors suggest that, in order to achieve this social benefit, banks should increase their equity levels. A recent study by the Bank for International Settlements (BIS) argues that the probability of a financial crisis would be reduced by 2.9 percentage points, if capital requirements were to increase by 2 percentage points (Admati et al., 2011). Based on estimations by the Bank of Canada in 2010, increased capital requirements would help the economy grow by 2% annually (Admati et al., 2011).

Similarly, the BCBS estimated the benefits of stronger capital and liquidity requirements coming from a reduction in the probability of banking crises (BCBS, 2010). More specifically, the BCBS estimates that an increase in capital requirements from 7% to 8% would lead to a reduction in the probability of banking crises by 1.6%. (BCBS, 2010). Similarly, liquidity requirements would contribute to a reduction in the probability of banking crises. The BCBS estimates that a 12.5% ratio of liquid assets to total assets would decrease the probability of banking crises by 0.8% (BCBS, 2010). However, the BCBS notes that, as capital and liquidity ratios increase, their impact on the reduction of the probability of banking crises would become weaker (BCBS, 2010). This can be explained by the fact that, when banks possess strong capital and liquidity ratios and, therefore do not face a threat of insolvency, any additional increase in

capital and liquidity ratios would lead to lower reductions in the probability of banking crises relative to the case when banks do not have strong capital and liquidity ratios (BCBS,2010).

A study by Schanz et al. examines the reduction in the probability of systemic banking crises due to increased capital requirements by using data from the 5 largest UK banks in 2007 (Schanz et al., 2011). The authors assumed that a systemic crisis exists, if at least 2 out of 5 biggest banks in the UK enter bankruptcy and, additionally, the authors assumed that a bank fails, if it has a Basel II capital ratio lower than 4%. The following figure illustrates the relationship between an increase in capital requirements and a reduction in the probability of systemic crises taken from the study by Schanz et al.

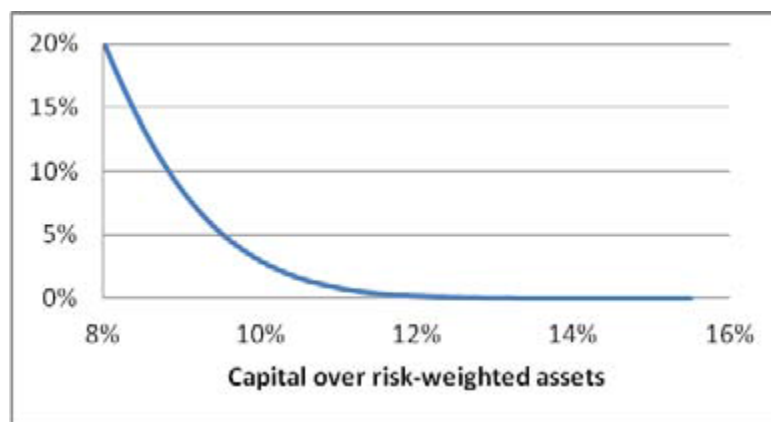


Figure 2. The relationship between the probability of systemic crises and the ratio of capital over risk-weighted assets (Source: Schanz et al., 2011)

For the UK, a study by Barrell et al. estimated that a percentage point increase in regulatory requirements could have led to a six percentage point reduction in the probability of a banking crisis during 2007 and 2008 (Barrell et al., 2009).

An additional benefit of stronger capital and liquidity requirements takes the form of a reduction in the volatility of output (BCBS, 2010). The BCBS estimated a median 1.9 percentage point reduction in output volatility when capital requirements increase by 2 percentage points and the ratio of liquid assets to total assets is 0 (BCBS, 2010). If liquidity effects were incorporated, then the reduction in output volatility would become larger. For instance, a 2 percentage point increase in capital ratio combined with a 25 percentage point increase in liquidity ratio provides a median output volatility decline of 3.1 percentage points (BCBS, 2010). If countercyclical capital buffers (CCB) were considered, then the median reduction in output volatility would be substantially higher (BCBS, 2010). For example, a 2 percentage point increase in capital

requirements combined with a 25% ratio of liquid assets to total assets would reduce output volatility by 17.9 percentage points (BCBS, 2010).

Other scholars interpret a reduction in the probability of a banking crisis due to tighter capital requirements into output gains. Miles et al. estimated that the economy would gain 55% of its current annual output from a percentage point reduction in the likelihood of a permanent banking crisis (Miles et al., 2011). The gain would be reduced to 20%, if it is assumed that a banking crisis has no permanent output effects (Miles et al., 2011). Schanz et al. estimated the expected gain to the economy from a “percentage point reduction in the probability of banking crises to be also 55% of GDP” (Schanz et al., 2011, p. 77)

Elliott underlines that the positive side of a substantial increase in capital requirements is an increase in tax revenues by the state, a reduction in the probability of future financial crises, a reduction of banks’ costs and the migration of business away from banks (Elliott, 2013).

When a bank faces losses which cause a reduction in the bank’s equity, then there are two corrective measures to help the bank restore its capital ratio (Admati et al., 2011). These are recapitalization and deleveraging via selling assets. However, deleveraging causes asset prices to fall and this also has negative repercussions on other market participants that possess those assets in their balance sheets. Moreover, deleveraging depends on the amount of capital a bank has. Better capitalized banks need to liquidate fewer of their assets in order to restore their capital ratios relative to banks with lower capital levels. As a result, higher capital requirements would reduce the probability of systemic repercussions that result from deleveraging effects (Admati. et al., 2011).

During the Great Depression in the US in the 1930s, the financial system suffered numerous bank runs⁴⁷. As a result, deposit insurance schemes were created by the US government and in other countries as a mechanism for lowering the probability of bank runs. An explicit deposit insurance scheme is a form of government protection given to depositors partly or fully, if a financial institution does not have the necessary funds to meet depositor claims. The primary reason why deposit insurance was created was the fact that the government wanted to alleviate

⁴⁷ A bank run occurs when depositors have fears about the viability of a financial institution and, more specifically, about the possibility of not receiving their money. As a result, they run *en masse* on the financial institutions to collect their claims. See the following article: George G. Kaufman. Bank Runs. The Concise Encyclopedia of Economics. 2008. Library of Economics and Liberty. Accessed March 29 2015 from the World Wide Web: <http://www.econlib.org/library/Enc/BankRuns.html>.

concerns in the public regarding the viability of a financial institution. Additionally, with deposit insurance, depositors had no incentive to monitor bank activities and did not even monitor how much equity financial institutions had (Myerson, 2014). Depositors left their money in bank accounts, knowing that, if something bad were to happen, the government would step in and they would collect their claims. From the perspective of banks, government guarantees brought numerous benefits. One benefit is that banks were able to borrow money at very low interest rates regardless of their equity levels. Those low interest rates at which banks borrowed money did not properly correspond to the risks borne by creditors because of the fact that banks possessed less equity. In general, banks had no incentive to increase their equity levels substantially because they knew that if it was not possible to fulfill the demands of depositors, then the government would step in and “save them”. Instead, with government guarantees, banks have incentives to take on as “much debt as they can, become as much systemic as possible and take as much risk as possible” (The Economist, 2013)⁴⁸. However, from a public policy perspective, deposit insurance schemes brought a new responsibility to the government and, more specifically, to public regulators. This responsibility has to do with monitoring equity requirements in banks (Myerson, 2014).

Admati et al. point out that, in a better capitalized banking environment, there would be less government intervention to support the banking sector in the event of a crisis (Admati et al., 2011). This would substantially reduce the costs to taxpayers. The authors present two arguments. Firstly, there would be a reduction in the probability of bailouts because better capitalized banks can absorb substantial decreases in asset values without becoming bankrupt - so the probability of financial distress would be lower the more equity a bank has. Secondly, the amount required for bailing out banks would be lower, given the fact that most of the losses would be absorbed by equity cushions.

A benefit of higher capital requirements is that they alleviate concerns among depositors regarding the bank’s ability to pay their claims. In other words, increased equity requirements enhance the convertibility of deposits into money in order for depositors to perform their payments (Admati & Hellwig, 2013).

⁴⁸ See the article: Equity Capital Requirements. The People versus the Bankers (2013, February 13). *The Economist*. Accessed 29 March 2015. Retrieved from <http://www.economist.com/blogs/freeexchange/2013/02/equity-capital-requirements>.

Additionally, Admati et al. prove that higher equity requirements reduce the riskiness of equity holders (Admati et al., 2011). Figure 2, taken from Admati et al., aims to explain their argument.

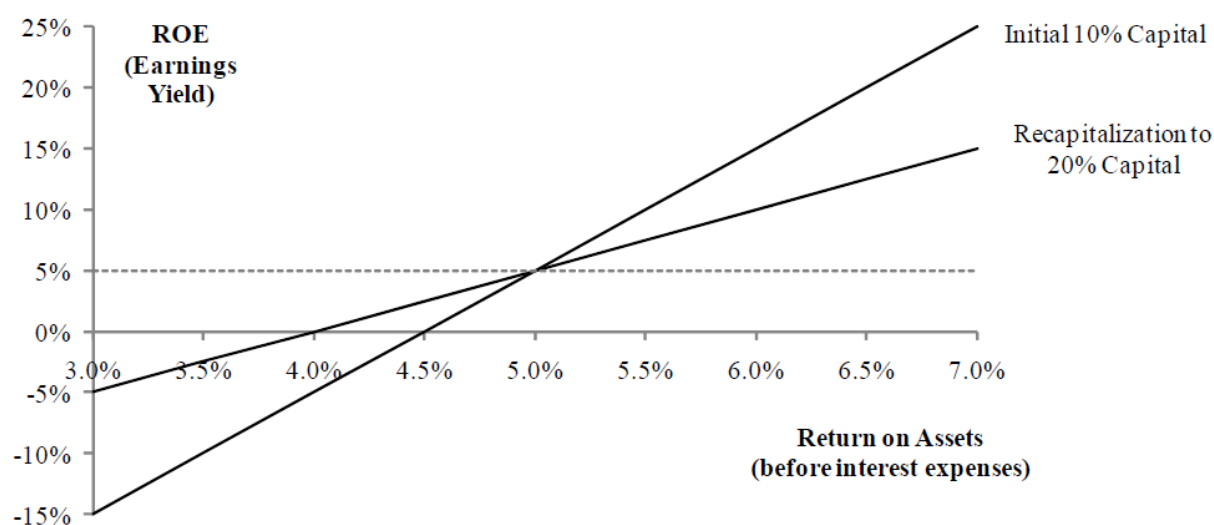


Figure 3. The effect of increased equity on the ROE (Source: Admati et al., 2011)

Figure 3 presents the relationship between the realized return on equity (ROE) and the return on assets (ROA) before interest expenses when banks have 10% initial capital and 20% initial capital, respectively⁴⁹. It is clearly observable that, for low levels of equity, the line is steeper relative to high levels of equity. The two lines match when ROE is equal to the “after tax rate on interest” which is assumed to be 5% in the figure. An important consideration in the figure is that, when ROA is above 5%, ROE is higher with lower capital levels, and, below the 5% rate, ROE is higher with higher capital levels, because higher capital levels provide protection to equity holders and reduce their risks. Additionally, it can be clearly concluded from the figure that, with less equity capital, there are greater fluctuations in ROE compared to more equity capital levels. As a result, under *higher equity levels, the equity holders face less risk* and this reduction in risk is reflected in the expected ROE of equity holders (Admati et al., 2011).

Admati et al. believe that higher equity requirements, being priced correctly by financial markets based on their risk characteristics, decrease the reliance on guarantees provided by the government and focus more on the private sector to support the financial safety of the system.

⁴⁹ Admati et al. explain that “given a capital structure the relationship is described by a straight line which is given by the equation $ROE = (ROA \times A - r \times D)/E = ROA + (D/E)(ROA - r)$. ROA is the return on assets, A is the total value of firm’s assets, E is equity, D is debt, and r is the (after-tax) interest rate on debt” (Admati et al., 2011, p. 15).

More specifically, the authors state that, under higher equity requirements, the distortions related to the safety net would be less severe⁵⁰ (Admati et al., 2011).

This chapter presented the major benefits of increasing capital requirements in banking. The next chapter presents the main arguments which are against an increase in capital requirements in banking.

⁵⁰ It is important to note here that, according to Admati et al., “resolution authorities” is another proposal to eliminate government guarantees. The “resolution authorities” would collect funds to provide protection to financial institutions, which are in financial distress and need to be bailed out. The funds would be collected by imposing a fee on these institutions which will represent the “true cost of guarantees”. Additionally, this mechanism entails important challenges. First, imposing a fee to reflect the risks being taken is a challenging task. Given that risk monitoring is a difficult process, this would encourage individual banks to take more risks (Admati et al., 2011).

Chapter 4. The societal and entrepreneurial costs of increased capital requirements

Chapter 2 of this Master Thesis presented a set of new proposals which were introduced by the BCBS in order to address the market failures that appeared during the recent financial crisis. Before the financial crisis, banks operated with low levels of capital and very high levels of leverage, which later proved to be detrimental for banks and, most importantly, for society. Admati et al. mention that, in the run up to the financial crisis, banks operated with a ratio of equity to total assets of 3 percent or less (Admati et al., 2011). This chapter is going to examine the societal and entrepreneurial costs of higher capital and liquidity requirements imposed on banks by regulators and discuss the main arguments against increasing capital requirements in banking.

Many in the banking industry adhere to the idea that equity is “expensive”. Merton Miller provides an example regarding banking industry views about increasing equity levels. In response to a banker complaining about lending opportunities that remained unexploited, Merton Miller suggested raising the bank’s capital. However, the banker replied that raising equity is “too expensive”⁵¹. The main argument of bankers is that an increase in the equity requirements of banks would make bank loans more expensive and, as a result, this would undermine economic growth and investment (Admati et al., 2011).

Moreover, an argument against higher capital requirements is that they would disrupt the main business of banks, which is the acceptance of deposits and the provision of loans (Admati et al., 2011). In other words, the arguments focus on the fact that higher bank capital requirements require a downward adjustment of their balance sheets.

⁵¹ “The banker sitting next to me was lamenting the profitable lending opportunities being passed up by capital constrained banks, when I broke in to ask: ‘Then, why don’t you raise more capital?’...’ They can’t’ he said. ‘It’s too expensive. Their stock is selling for only 50 percent of book value’. ‘Book values have nothing to do with the cost of equity capital’, I replied. ‘That’s just the market’s way of saying: We gave those guys one dollar and they managed to turn it into 50 cents’ (Admati & Hellwig, 2013, p. 100).

Additionally, equity is claimed to be more expensive than debt, because equity holders have a residual claim, which means that it is more likely that equity holders will bear losses in case a bank fails, and thus makes them require a higher return (a risk premium) than debt holders (Admati et al., 2011). As a result, when banks use more units of expensive equity, their total funding costs increase (Admati et al., 2011).

Opponents of higher capital requirements argue that equity is expensive due to the asymmetry of information between bank managers and investors. The Myers and Majluf theorem provides evidence to the argument that equity funding is a costly way of funding. According to this theorem, when managers who have better information regarding a firm's assets decide on whether to finance an investment with debt or with equity, they prefer to finance the investment with equity when they believe that the market overvalues their stock (Myers & Majluf, 1958). However, investors rationally believe that managers think that their company is overvalued by the market and assume that an equity issuance is "bad news about the firm". As a result, investors offer to buy the shares at a lower price (Myers & Majluf, 1984). Because of this negative signaling effect, banks usually refrain from issuing new equity to meet higher capital requirements and usually respond to an increase in capital requirements by reducing their lending business (Admati et al., 2011).

At Deutsche Bank's conference in London in October 2010, Ackermann made the following statement: "Demands for Tier-1 capital ratio of 20% as proposed by some academics could depress ROE to levels that make investment into the banking sector unattractive relative to other business sectors" (Ackermann, 2010, p. 5). The argument is that higher capital requirements would lower the returns that equity holders receive and would thus lead to a loss in shareholders' value. This could substantially transfer investments away from banking and into other industries where equity holders can enjoy higher returns (Admati et al., 2011).

Other arguments support that higher capital requirements would increase banks' funding costs by disabling banks to borrow at favorable rates supported by preferable tax treatment and government guarantees (Admati et. al., 2011). Government policies affect investment and financing decisions of banks through 2 ways: taxes and guarantees. Many corporate tax laws around the world consider interest payments on debt to be a tax deductible expense. This gives a substantial advantage to debt financing over equity financing. Additionally, guarantees provided by the government in the form of debt are particularly beneficial to banks, especially if they are considered to be too big to fail. Due to these guarantees, investors are willing to lend cheaply to banks at very low rates, because investors anticipate that, in the case of financial

distress, the government would step in and save the bank. Debt attractiveness over equity is primarily due to taxes and government guarantees (Admati et al., 2011). Thus, the argumentation that increased equity requirements make banks exploit fewer tax shields and implicit guarantees by the government is correct (Admati et al., 2011).

An argument against increasing equity requirements in banking focuses on the disciplinary role that debt has in bank management⁵². The argument here is that higher equity requirements reduce the disciplinary role that debt has in bank management (Admati et al., 2011). Admati et al. identify two ways through which debt can exert discipline in bank management. Firstly, the fixed claim held by debt holders operates as a disciplinary mechanism on management and, as a result, managers do not engage in undertaking risky and wasteful investments. Secondly, the ability of debt holders not to renew their funding if something goes wrong removes the moral hazard⁵³ issues that exist between bank management and debt holders (Admati et al., 2011).

One of the basic arguments regarding the costs of increasing capital requirements is the fact that they would have a negative impact on the lending behaviour of banks as well as on other activities performed by banks which are considered to be *socially valuable* (Admati et al., 2011). The argument here focuses on the fact that when banks increase their equity ratios, then their lending business will decrease. A decrease in lending business will negatively impact economic growth. Vikram Pandit, a former CEO of Citi Bank, puts it clearly in his article in the Financial Times in 2010, stating that “double-digit ratios will undermine lending, slow capital formation, lower demand and restrict growth. They will impede recovery by raising the cost of credit precisely when it is needed most”⁵⁴.

Admati et al. identify two types of arguments regarding the impact of increased equity capital requirements on bank lending (Admati et al., 2011). The first type of argument is focused on the fact that, when banks are not adequately capitalized, then they will decrease their lending business or any other investments in order to boost their capital levels. The second type of

⁵² Jensen & Meckling discuss the disciplinary role that debt has in bank management (Jensen & Meckling, 1976).

⁵³ Mishkin claims that moral hazard occurs in a transaction when “the lender runs the risk that the borrower will engage in activities that are undesirable from the lender’s point of view because they make it less likely that the loan will be paid back” (Mishkin, 2010, p. 41).

⁵⁴ See the following article: Pandit, V. (2010, November 10). We Must Rethink Basel, or Growth Will Suffer. *The Financial Times*. Accessed 09 April 2015. Retrieved from <http://www.ft.com/intl/cms/s/0/6a490e8a-ed03-11df-9912-00144feab49a.html#axzz3KqAv4lY9>.

argument is focused on the fact that increased capital requirements on banks would affect their lending decisions, forcing them to put restrictions on their lending criteria (Admati et al., 2011).

There are arguments in the academic industry stating that increased equity requirements would limit bank leverage and this entails large private and social costs. The main point here is that high levels of leverage in banks, as well as their preference to finance their activities with debt and not with equity might be the optimal way of financing for them⁵⁵ (Admati et al., 2011).

Lastly, there is the belief that high equity requirements would move banking activities away from the regulated and towards the unregulated banking sector, the so-called SBS (Admati et al., 2011). Based on the fact that these institutions do not have enough equity in their balance sheets, if any at all, there is the fear that, if many activities are transferred from the regulated banking system into the unregulated banking system, then the banking system as a whole would become even more fragile (Admati et al., 2011).

In February 2010, the BCBS & the FSB assigned a group of experts called the Macroeconomic Assessment Group (henceforth MAG) to compile a report in order to assess the macroeconomic impact of the transition towards higher capital and liquidity requirements⁵⁶ (BCBS & FSB, 2010). The objective of the MAG is to estimate the transitory costs for the macro-economy of stronger capital and liquidity requirements (BCBS & FSB, 2010).

To compute the transitory costs of the new regulatory framework, the MAG used a "2-step approach" (BCBS & FSB, p. 2). Firstly, the MAG estimated the effects of stronger regulatory rules on lending spreads and lending volumes. Secondly, the MAG incorporated the changes in lending spreads and lending volumes into macroeconomic models to "forecast" the impact of the changes on consumption, investment and GDP (BCBS & FSB, 2010). The models considered 3 implementation periods, namely 2, 4 and 6 years as well as "a simulation run for 8 years" (BCBS & FSB, 2010). The implementation period started from the Q12011 and ended at Q42018 (BCBS & FSB, 2010). Additionally, the MAG focused on "target bank capital and liquidity ratios" (BCBS & FSB, 2010, p. 9). Capital was defined as the ratio of Tier 1 to total assets (BCBS & FSB, 2010).

⁵⁵ Kashyap, Rajan and Stein argue that "the tendency for banks to finance themselves largely with short term debt may reflect a privately optimal response to governance problems" (Kashyap, Rajan & Stein, 2008, p. 3).

⁵⁶ See the BCBS & FSB report titled *Assessing the Macroeconomic Impact of the Transition to Stronger Capital and Liquidity Requirements* (BCBS & FSB, 2010).

As previously noted, in the first part of the assessment, the MAG measured the impact of tighter regulatory requirements on lending spreads and lending volumes. The MAG found that a percentage point increase in capital requirements would lead to an increase in lending spreads by a median amount of 15 basis points⁵⁷ after 4 and a half years and by 16 basis points after 8 years (BCBS & FSB, 2010). Regarding the impact of new regulatory requirements on lending volumes, the MAG estimated that a percentage point increase in target capital ratios would reduce the availability of credit by 1.4 percentage points when the implementation period is 4 and a half years, and by 1.9 percentage points when the implementation period is 8 years (BCBS & FSB, 2010). Moreover, the MAG found a very weak statistical relationship between lending spreads and liquidity ratios.

Considering the impact of stronger capital requirements on the economy, the MAG estimated that a percentage point increase in capital requirements would lead to a GDP reduction by 0.16 percentage points from “its baseline level” in 4 and a half years after the start of the implementation period and by 0.10 percentage points at the end of the implementation period (BCBS & FSB, 2010). The impact of liquidity requirements on output was also taken into consideration. The MAG found that a 25 percentage point increase in liquid assets over total assets would lead to a reduction in output by 0.08 percentage points from its “baseline level” after a 4-and-a-half year implementation period, and by 0.13 percentage points at the end of the simulation period (BCBS & FSB, 2010).

The MAG provides insight into the main driving forces of the impact of tighter regulatory requirements on output by separating the models used to assess the impact based on different assumptions. Models that considered only lending spread effects and no monetary policy responses showed a fall in GDP by 0.16 percentage points from its “baseline scenario” after 18 quarters of the implementation period. Models that considered the impact of lending standards on credit availability showed a fall in GDP by 0.32 percentage points from its “baseline scenario” under an implementation period of 4 and a half years, and a reduction in GDP by 0.27 percentage points from its “baseline scenario” under an implementation period of 8 years (BCBS & FSB, 2010). Additionally, the MAG found that monetary policy responses mitigate the effects of tighter regulatory requirements on output. More specifically, the MAG considered monetary policy responses in both the models that considered credit availability effects and

⁵⁷ All the estimates of the MAG are based on median amounts (BCBS & FSB, 2010).

lending spread effects. The MAG found that a percentage point increase in “target capital ratios” would reduce output effects by 0.06 percentage points in both types of models (BCBS & FSB, 2010).

The MAG considered the impact of “international spillovers” (BCBS & FSB, 2010, p. 23) estimated by the IMF in its results on the output effects of new regulatory requirements⁵⁸. After 4 and a half years, the MAG found that international spillover effects would lead to a GDP decline by 0.03 percentage points “at the 18th quarter”, while this effect is less severe after 8 years of implementing the new requirements where GDP declines by 0.02 percentage points from its baseline (BCBS & FSB, 2010). By incorporating the effects of international spillovers into the output effects from increased capital requirements, the MAG estimated a GDP loss of 0.19 percentage points compared to its baseline level in the case of a 4-and-a-half year implementation period and a GDP loss of 0.12 percentage points in the case of an 8-year implementation period (BCBS & FSB, 2010). Moreover, the MAG argued that an extension in the implementation period would reduce the negative output effects. Overall, the MAG concluded that the transitory costs of tighter regulatory requirements are *minimal* under a supportive economic environment and a longer implementation period (BCBS & FSB, 2010).

Roger and Vlček studied the short- and medium-term macroeconomic impact of stronger capital and liquidity requirements by using a Dynamic Stochastic General Equilibrium (DSGE) model (Roger & Vlček, 2012). Their study is mainly focused on the cost-side of the new requirements. The authors presented the estimated costs of the new requirements for the Euro Area and for the United States, respectively. To measure the impact of stronger capital requirements, the authors assumed a 2 percentage point gradual increase in the ratio of Tangible Common Equity (TCE) to RWA over 2 years. To meet stronger capital requirements, the authors considered 3 different bank responses. Firstly, higher capital ratios could be achieved by banks through a reduction in dividend distribution and in the targeted long-term ROE. Secondly, banks could raise lending spreads and use the higher amount in retained earnings to build up capital. Lastly, banks could make adjustments on the left-hand side of their balance sheet. Table 2 and 3 present

⁵⁸ According to the MAG, international spillover effects are mainly “effects of regulatory requirements on exchange rates, commodity prices, trade flows and global asset values” (BCBS & FSB, 2010, p. 23). See the paper by Vitek titled *Monetary Policy Analysis and Forecasting in the World Economy: A Panel Unobserved Components Approach* (Vitek, 2009).

the results regarding the macroeconomic costs of an increase in capital requirements for the Euro Area and US, respectively (Roger & Vlček, 2012).

Table 2. The Euro Area - Effects of tighter Capital Requirements (Roger & Vlček, 2012) (2 p.p increase in Capital Requirements over 2 years)				
	Scenario			
	Dividend policy and ROE	Lending Margins	Reducing Bank Assets	
			LTV ratio and riskiness changed	LTV ratio changed by 1 p.p
Peak lending spread (basis points)	100	120	25	120
Long run lending spread (basis points) ^{1/}	0	15	5	14
Peak output decline (%)	-0,5	-0,6	-0,9	-1,3
Long run output decline (% p.a)	0	-0,1	-0,1	-0,2
Transition costs (% p.a.) ^{2/}	-1,2	-2	-2,5	-4
1/ Approximated by the end of 2018.				
2/ Transition costs approximated as cumulative output loss.				

Table 2. The effects of tighter capital requirements in the Euro Area (Source: Roger & Vlček, 2012)

Table 3. The United States - Effects of tighter Capital Requirements (Roger & Vlček, 2012) (2 p.p increase in Capital Requirements over 2 years)				
	Scenario			
	Dividend policy and ROE	Lending Margins	Reducing Bank Assets	
			LTV ratio and riskiness changed	LTV ratio changed by 1 p.p
Peak lending spread (basis points)	80	130	30	125
Long run lending spread (basis points) ^{1/}	0	20	5	18
Peak output decline (%)	-0,3	-0,5	-0,9	-1,3
Long run output decline (% p.a)	0	-0,1	-0,2	-0,2
Transition costs (% p.a.) ^{2/}	-0,9	-2	-2,9	-4,3
1/ Approximated by the end of 2018.				
2/ Transition costs approximated as cumulative output loss.				

Table 3. The effects of tighter capital requirements in the United States (Source: Roger & Vlček, 2012)

From tables 2 and 3, it can be deduced that, in the first case, where adjustments in dividend policy and ROE are made, European banks need to increase their lending rates by a peak of 100 basis points, while lending rates for American banks need to increase by a peak of 80 basis points in order to meet the increased capital requirements. Furthermore, over a 2-year implementation period, the cumulative output loss would be 1.2 percentage points in the Euro Area and 0.9 percentage points in the United States. Moreover, the authors note that, when banks are able to meet their capital requirements, “a reintroduction of dividends and reduction of lending rates is achieved” (Roger & Vlček, 2012, p. 12). In the second scenario, American

banks would need to increase lending spreads by a peak of 130 basis points and European banks by a peak of 120 basis points in order to meet the “target capital ratios”. “Cumulative output loss” is estimated to be 2 percentage points of GDP over a 2-year implementation period for both the Euro Area and the US⁵⁹. The third scenario involves a reduction in the assets of banks through a reduction in the loan to value ratio⁶⁰. The authors assumed 2 options for banks to reduce their loan-to-value ratios in order to meet stronger capital requirements. Firstly, banks reduce their loan-to-value ratios by decreasing the amount of their loans regardless of their riskiness (last column) while in the second case banks focus on decreasing their Loan-to-value (LTV) ratio mainly by reducing the amount of their risky loans (penultimate column). In the first case, US banks need to increase their lending spreads over the implementation period by a peak of 125 basis points and decrease their lending by 6.4 percentage points to meet the capital ratios, while lending spreads for EA banks will increase by a peak of 120 basis points and lending availability would decrease by 5.1 percentage points (Roger & Vlček, 2012). Tables 2 and 3 show that output declines would reach a peak of 1.3 percentage points in the US and EA, respectively. The macroeconomic impact of stronger capital ratios is less severe when banks meet capital ratios by reducing the riskiness of their portfolios. It can be observed from tables 2 and 3 that lending spreads reach a peak of 30 basis points and 25 basis points for the US and EA, respectively, the cumulative output loss is in the range of 2.5 for the EA and 2.9 for the US, and a 0.9 percentage point decline in the maximum output is observed for both economies (Roger & Vlček, 2012).

Additionally, Roger and Vlček estimate the impact of an increase in liquid assets both on the EA and US banking sectors and on the economy (Roger & Vlček, 2012). They assume a 25 percentage point increase in liquid assets, mainly expressed as an increase in the holdings of government securities. Tables 4 and 5 give an overview of their results for both the Euro Area and the United States. The authors estimate the impact of stronger liquidity requirements based on 2 scenarios. In the baseline scenario, the authors assumed that greater holdings of liquid

⁵⁹ The cumulative output loss is larger than in the first scenario mainly due to the fact that lending spreads remain high and do not decrease, as it is assumed in the first case. (Roger & Vlček, 2012).

⁶⁰ The loan to value ratio is defined as the ratio of the amount of money a person has borrowed to buy a property against the value of that property. See the following webpage: Loan-to-Value Ratio Restrictions - FAQs. *Reserve Bank of New Zealand*. Accessed 09 April 2015. Retrieved from http://www.rbnz.govt.nz/financial_stability/macro-prudential_policy/5393159.html.

assets do affect the riskiness of bank's assets, while, in the alternative scenario, stronger liquidity requirements do not affect the riskiness of a bank's assets.

In the first scenario, the increase of liquid assets in a bank's balance sheet has two effects. Firstly, when a bank holds a greater amount of liquid assets, its revenues would decrease because more liquid assets have lower risk and give lower returns. If banks do not adjust their ROE levels, then banks need to increase lending spreads to balance the negative impact on revenues due to a higher proportion of low risk assets in a bank's balance sheet, which are more liquid (Roger & Vlček, 2012). Secondly, capital requirements for banks holding more liquid and less risky assets are lower compared to banks which hold less liquid and more risky assets. A lower capital requirement would decrease the level of lending spreads. The authors estimated that, in the "baseline scenario", the "net effect" of stronger liquidity requirements on lending spreads would be 50 basis points in the Euro Area and 60 basis points in the US. Moreover, the "overall output loss", due to stronger liquidity requirements, is 0.8 percentage points for the Euro Area and 1.1 percentage points for the US (Roger & Vlček, 2012).

In the second scenario, it is assumed that stronger liquidity requirements do not impact the riskiness of the assets. As shown in table 4, the impact on lending spreads is higher in this case compared to the baseline scenario, reaching a peak of 180 basis points for the Euro Area and 195 basis points for the US respectively. Additionally, cumulative output loss reaches 3 percentage points in the Euro Area and 3.2 percentage points in the US (Roger & Vlček, 2012). In general, in this scenario, the macroeconomic impact of stronger liquidity requirements is more severe compared to the baseline scenario.

Table 4.The Euro Area - Effects of tighter Liquidity Requirements (Roger & Vlček, 2012) (25 p.p. Increase in Liquidity Requirements over 2 years)		
	Scenario	
	Baseline	No effects on riskiness
Peak lending spread (basis points)	50	180
Long run lending spread (basis points) ^{1/}	5	20
Peak output decline (%)	-0,2	-0,9
Long run output decline (% p.a) ^{1/}	0	-0,1
Transition costs (% p.a.) ^{2/}	-0,8	-3
1/ Approximated by the end of 2018. 2/ Transition costs computed as cumulative output loss.		

Table 4. The effects of tighter liquidity requirements in the Euro Area (Source: Roger & Vlček, 2012)

Table 5.The United States - Effects of tighter Liquidity Requirements (Roger & Vlček, 2012) (25 p.p. Increase in Liquidity Requirements over 2 years)		
	Scenario	
	Baseline	No effects on riskiness
Peak lending spread (basis points)	60	195
Long run lending spread (basis points) ^{1/}	20	40
Peak output decline (%)	-0,2	-0,7
Long run output decline (% p.a) ^{1/}	-0,1	-0,2
Transition costs (% p.a.) ^{2/}	-1,1	-3,2
1/ Approximated by the end of 2018. 2/ Transition costs computed as cumulative output loss.		

Table 5. The effects of tighter liquidity requirements in the United States (Source: Roger & Vlček, 2012)

The authors considered the macroeconomic costs of stronger capital and liquidity requirements under a longer implementation period and a reaction by monetary policy authorities. The authors concluded that a four-year implementation period reduces the impact of stronger capital and liquidity requirements on lending spreads by 1/3 compared to the impact of stronger capital and liquidity requirements on lending spreads, which is estimated under a two-year implementation period. However, a longer implementation period would not change the impact on the cumulative output losses due to stronger regulatory requirements (Roger & Vlček, 2012). Moreover, monetary policy responses manage to reduce the negative effects of tighter

regulatory requirements on cumulative output losses as well as on investment and consumption. (Roger & Vlček, 2012). Overall, the authors concluded that the negative effects of stronger capital and liquidity requirements on the economy would be “moderate” under a gradual adjustment to the new requirements.

A study by the BCBS (BCBS, 2010) estimated the long-run costs of stronger capital and liquidity requirements⁶¹ on the economy. An important difference of this report from the report by the Macroeconomic Assessment Group (MAG) (BCBS & FSB, 2010), the results of which were presented above, is that this report investigated the effects of stronger capital and liquidity requirements once the capital and liquidity ratios of banks have adjusted to the proposed levels (BCBS, 2010). However, the MAG examined only the transitory costs towards meeting the stronger capital and liquidity requirements and not the benefits at all, as is the case with the BCBS report (BCBS, 2010).

The BCBS presented the costs of higher capital and liquidity requirements on the economy and society (BCBS, 2010). The BCBS represented these costs as losses in output and increases in lending spreads in the banking sector (BCBS, 2010).

Regarding the impact of stronger capital and liquidity requirements on lending rates, the BCBS estimated that a percentage point increase in the capital ratio would increase lending spreads by 13 basis points ⁶²⁶³(BCBS, 2010). In the report, it is assumed that ROE remains unchanged⁶⁴. According to the report, if ROE was allowed to decrease, then the impact on lending spreads would be smaller (BCBS, 2010). For instance, under a 10% ROE, a percentage point increase in the capital ratio would reduce the impact on lending spreads by 6 basis points, i.e. an increase of 7 basis points in lending spreads. Apart from a rise in lending spreads, there are other ways through which the costs from increased capital requirements could be reduced. The BCBS proposed 3 ways through which banks could offset the costs in their net income from higher capital ratios. Firstly, banks could increase the cost of “non-interest” services; secondly, banks

⁶¹ See the study titled *An Assessment of the Long-term Economic Impact of Stronger Capital and Liquidity Requirements* (BCBS, 2010).

⁶² The capital ratio in the study of the BCBS is mainly computed as the ratio of Tangible Common Equity to RWA. “Tangible Common Equity is Common Equity net of Goodwill and Intangibles. Common equity equals Common stock plus Additional Paid-in Capital plus Retained Earnings minus Treasury Shares” (BCBS, 2010, p. 7).

⁶³ “A basis point is one one-hundredth of a percentage point” (Gregory, 2010, p. 395).

⁶⁴ The report assumes a 14.8% average ROE which is assumed to be the average cost of equity capital for each country in the sample over 15 years (BCBS, 2010).

could pay less for deposits; thirdly, banks could decrease their administration expenses (BCBS, 2010).

Additionally, the impact of liquidity requirements on lending spreads ranges between 14 basis points or less and 25 basis points depending on whether or not there is a decline in RWA (BCBS, 2010)⁶⁵. Additionally, the increase in lending spreads from stronger liquidity requirements depends on how much money the bank lost while shifting from high-profitable, risky investments to less-profitable safer investments (BCBS, 2010).

Furthermore, higher capital and liquidity requirements do impact output. The results show that an increase in the capital ratio by 1 percentage point would lead to a median decline in output by 0.09 percentage points⁶⁶ (BCBS, 2010). Moreover, if liquidity effects were considered and a fall in RWA was allowed, then output would fall by 0.08 percentage points (BCBS, 2010). If liquidity effects were taken into account and a fall in RWA was not allowed, then output would fall by 0.15 percentage points (BCBS, 2010). In general, a percentage point increase in the capital ratio accompanied with a simultaneous increase in the ratio of liquid assets to total assets would lead to an output loss of 0.17 percentage points, if a fall in RWA was considered, or an output loss of 0.24 percentage points, if a fall in RWAs was not considered (BCBS, 2010).

The Institute of International Finance (IIF) measured the costs of new regulatory requirements based on what their effects on GDP are and on jobs lost in major economies such as the United States, the Euro Area and Japan (IIF, 2010). The effects of stronger capital and liquidity requirements are assessed on the basis of 2 different scenarios: a scenario which assumes no change in regulation and a scenario which does consider a change in regulation. The difference in the estimates of the two scenarios provides the net cumulative effects of the new reforms (IIF, 2010). The effects of the new reforms are assessed for the period from 2011 to 2020, but results are presented for the period from 2011 to 2015. The IIF found that stronger capital and liquidity requirements would lead to an annual real GDP reduction of 0.6 percentage points for the period from 2011 to 2015 and to an annual reduction of 0.3 percentage points for the period

⁶⁵ In the report, liquidity requirements refer to the amount of liquid assets needed to meet the Net Stable Funding Ratio (NSFR). Based on the methodology used, a ratio of 25% of liquid assets over total assets is required to meet the NSFR. Liquid assets are mainly cash, deposits with central bank and securities. Additionally, when a bank increases the amount of liquid, high-quality assets, it decreases its RWA because it holds in general less risky assets, which have lower risk weights (BCBS, 2010).

⁶⁶ Alternative studies focus on the impact of capital requirements on consumption. The main result of these studies is that an increase in capital requirements by 1 percentage point would lead to a decrease in consumption by 0.10 percentage points (BCBS, 2010).

from 2011 to 2020 (IIF, 2010). Moreover, the most affected economy of the new reforms, in terms of the impact on real GDP, is the Euro Area, followed by the United States and Japan. Additionally, the IIF found that stronger capital and liquidity requirements would increase lending spreads by 132 basis points from 2011 to 2015 and by 99 basis points from 2011 to 2020 (IIF, 2010). Furthermore, by 2020, over 10 million jobs would be lost in the three major economies due to stronger capital and liquidity requirements (IIF, 2010). Chart 1 depicts the effects of stronger capital and liquidity requirements on real output and on employment respectively.

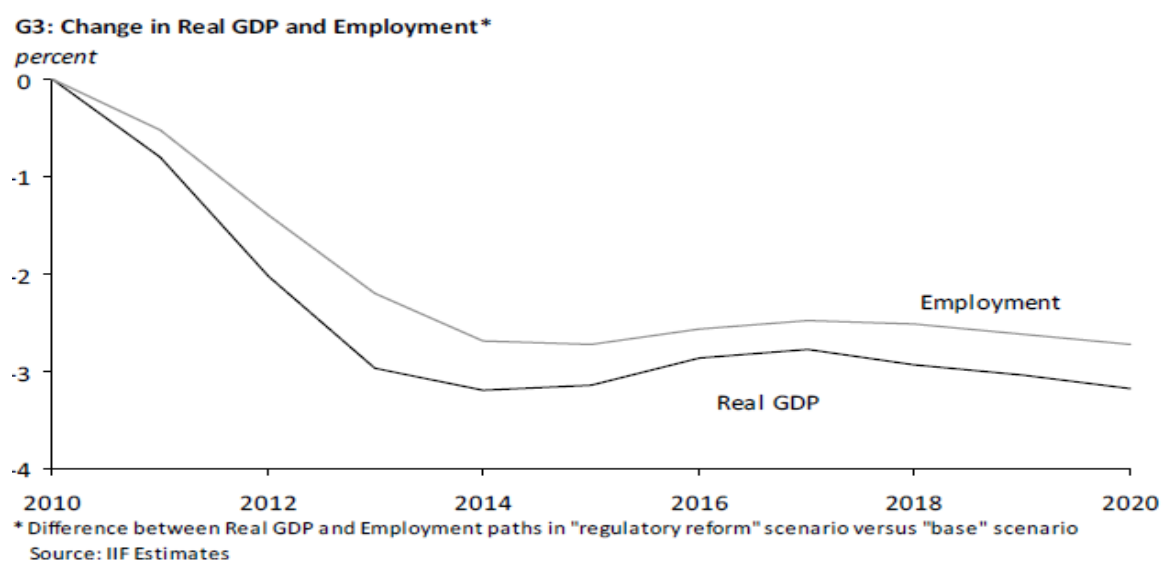


Chart 1. Impact of higher capital and liquidity requirements on real GDP and employment (Source: IIF, 2010)

Additionally, the IIF estimated that banks in the 3 major economies (United States, Euro Area and Japan) need to raise approximately \$0.7 trillion in Core Tier 1 Equity as well as to issue \$5.4 trillion of long-term debt to meet the new regulatory requirements during 2011-2015. The IIF argued that the substantial size of those estimates would increase the cost of debt and equity funding for banks (IIF, 2010).

Slovik & Cournède from the Organization for Economic Co-operation and Development (hereinafter OECD) measured the medium-term effects of the new regulatory reforms (Slovik & Cournède, 2011) on the economic output of 3 major OECD economies⁶⁷. By using data based on bank balance sheets from 2004 to 2006, a pre-crisis period, the authors found that a

⁶⁷ The economies examined are the United States, the Euro Area and Japan (Slovik & Cournède, 2011).

percentage point increase in bank capital requirements would lead to an increase in lending rates by 14.4 basis points (Slovik & Cournède, 2011).

Moreover, Slovik & Cournède estimated the impact on lending rates when banks have to adjust their capital requirements in 2015 and in 2019, respectively (Slovik & Cournède, 2011). The results show that lending rates would have to increase by an average of 15.1 basis points to meet Basel 3 requirements, which will come into effect in 2015. Additionally, a greater increase in lending rates by approximately 51 basis points is required in order to meet Basel 3 requirements, which will come into effect in 2019 (Slovik & Cournède, 2011).

In terms of the medium-term macroeconomic effects of new regulatory requirements, Slovik & Cournède estimated that across the 3 major OECD economies, a percentage point increase in capital requirements would lead to an average reduction in GDP growth by 0.20 percentage points after five years of implementing the new requirements. Using this number for an annual estimate, Slovik & Cournède note that a percentage point increase in capital requirements would lead to an annual decline in GDP by 0.04 percentage points (Slovik & Cournède, 2011).

Moreover, Slovik & Cournède estimated the impact on GDP growth under the levels of the Basel 3 capital requirements which will come into effect in 2015 and under the levels of the Basel 3 capital requirements which will come into effect in 2019. The study found that the Basel 3 capital requirements which will come into effect in 2015 will reduce GDP growth by an average of 0.05 percentage points per year. Furthermore, the Basel 3 requirements which will come into effect in 2019 will reduce GDP growth by an average of 0.15 percentage points per year (Slovik & Cournède, 2011). Overall, Slovik & Cournède estimated the medium-term impact of the new reforms on annual GDP growth to be between 0.05 and 0.15 percentage points.

Slovik & Cournède identified certain factors that could mitigate the macroeconomic effects of the Basel 3 capital requirements. These are responses from monetary authorities, reductions in bank funding costs - mainly in the cost of equity - and use of less discretionary capital buffers (Slovik & Cournède, 2011).

In another study, Chun, Kim and Ko (hereinafter Chun et al.) provided estimates of the impact of stronger capital and liquidity requirements on lending spreads by considering the effects of regulatory requirements on different countries and different business models (Chun et al., 2012). To measure the effects of stronger capital requirements on bank lending spreads, the authors used an accounting-based approach based on balance sheet and income statements for

different business models and for the period from 2005 to 2010. Overall, the sample includes 670 banks from 16 countries (Chun et al., 2012). The study assumed that banks do not react to an increase in lending spreads by reducing their level of ROE (Chun et al., 2012).

Across different business models, the authors found different effects of a percentage point increase in capital requirements. For instance, a percentage point increase in the capital ratio would lead to an increase in lending spreads by 0.1 basis points and by 9.1 basis points for real estate mortgage banks and for commercial banks respectively (Chun et al., 2012). Moreover, across countries, the authors also found different increases in lending spreads as a response to a percentage point increase in capital requirements. More specifically, the authors found that a percentage point increase in capital ratios would lead to huge increases in lending rates mainly for Brazil, China, India and Mexico, while the impact on countries such as Germany, Australia, Switzerland, Italy and the Netherlands would be less severe. For the first group of countries, the authors found an increase in lending spreads ranging from 13.2 basis points to 29.7 basis points from a percentage point increase in capital levels. The effect for the second group of countries would be an increase in lending spreads, ranging mainly from 1.1 basis points to 4.1 basis points (Chun et al., 2012).

Moreover, the authors measured the impact of stronger liquidity requirements on lending spreads. More specifically, the authors measured how much lending spreads need to increase to meet a target NSFR equal to 1⁶⁸. The finding here is that to meet a NSFR equal to 1, an increase of approximately 20 basis points in lending spreads for commercial banks is required (Chun et al., 2012).

King also attempts to measure the steady-state impact of stronger capital and liquidity requirements on bank lending spreads (King, 2010). The author used data for 6,844 banks from 13 OECD countries from 1993 to 2007.

Regarding the impact of stronger capital requirements on lending spreads, King estimated that an increase in lending rates by 15 basis points would be required to cover the costs from a percentage point increase in capital requirements so that the costs of equity and debt do not change (King, 2010). Banks respond to a percentage point increase in capital ratios “by increasing shareholder’s equity and by reducing wholesale funding” (King, 2010, p. 2). As a

⁶⁸ NSFR is expressed as the ratio of available stable funding (ASF) to required stable funding (RSF). A target ratio means that ASF is larger than RSF (Chun et al., 2012).

result, ROE decreases, as net income is distributed to a larger proportion of shareholder equity (King, 2010). The author assumed that a bank's ROE and cost of debt do not change (King, 2010). Additionally, in this framework, no other income sources exist for banks apart from those coming from their loan business, and it is assumed that banks cannot decrease their operating costs to balance the costs arising from an increase in capital requirements (King, 2010). If ROE and the cost of debt were to decline due to a less risky capital structure, then the effects on lending spreads would be less severe. The author made three different assumptions for the fall in ROE and the cost of debt per percentage point increase in capital levels. The author estimated that, if the cost of equity and debt were to fall by 10, 15 and 20 basis points, then lending spreads would increase by 13, 12 and 11 basis points, respectively, to cover the percentage point increase in capital requirements (King, 2010).

Additionally, the author estimated the amount of the increase in lending spreads required to balance the costs of holding more liquid and less risky assets (King, 2010). For this estimation, the author made 2 assumptions. The author presented one part of his findings based on the assumption that RWAs do not fall and the other part of his finding on the assumption that RWAs do fall because assets having high risk-weights are substituted by assets with low risk-weights, such as government bonds. In the first case, the author found that lending spreads would increase by approximately 24 basis points, while in the second case, lending rates would increase by 12 basis points or even by a lower amount (King, 2010). Overall, regardless of whether or not a fall in RWA is assumed, a 40-60 basis points increase in lending rates is required to cover the costs of meeting the NSFR and the costs arising from a 2-percentage point increase in capital levels (King, 2010).

Santos & Elliott studied the long-run impact of stronger capital and liquidity requirements on lending spreads for 3 different countries, i.e. the US, the Euro-Area and Japan (Elliott & Santos, 2012). The authors developed a formula which estimated the impact of stronger regulatory requirements on lending spreads. The authors assumed that, in the "baseline case", the safety margins of banks are similar to the levels they had at the end of 2010⁶⁹ (Elliott & Santos, 2012, p. 5). Other assumptions made are that banks partially internalize the costs of financial regulation by reducing their expenses and that the costs of equity and debt are reduced as a result of better capitalized and safer banks (Elliott & Santos, 2012). The authors found that the

⁶⁹ The authors assumed "a 10% minimum requirement of CET1 over RWAs" (Elliott & Santos, 2010, p. 13).

impact of the Basel 3 regulation on lending spreads varies across the countries examined. They found that, in the long run, lending spreads increase in the United States by 28 basis points, in the Euro Area by 17 basis points and in Japan by 8 basis points to meet Basel 3 capital and liquidity requirements. The authors compare the effects of new regulatory requirements with the effects of an increase of 25 basis points in short-term policy rates by central banks, which have small effects on growth, and conclude that the impact of new regulatory requirements would be generally small (Elliot & Santos, 2012).

Kashyap et al. provide an estimate of the long run steady-state costs of increased capital requirements (Kashyap et al., 2010). The authors conclude that an increase in capital ratios by 10 percentage points would have a “modest” effect on lending spreads, ranging from 25 to 45 basis points based on different assumptions⁷⁰. Additionally, the authors highlight the fact that the costs of tighter capital requirements would be smaller under a longer transitional period.

Elliott provides an assessment of the effects of increased capital requirements on bank lending spreads for the US banking system (Elliott, 2009). By using data from the Federal Deposit Insurance Corporation (FDIC) and with the help of an accounting-based approach, he found that a 2% increase in capital ratios⁷¹ would increase lending rates by 38 basis points for the ROE to remain at the level of 15% as assumed. If a decline in ROE to 14.5% were allowed, then a 2% increase in capital ratio would increase lending spreads by 9 basis points (Elliott, 2009). Overall, Elliott supports the view that the US banking system can successfully adjust to the new regulatory requirements through various actions without causing any harm to the financial system (Elliott, 2009). In another paper, Elliott examined the impact of higher capital requirements on the pricing of loans when banks are different in size, offer different types of loans and have different types of customers (Elliott, 2010). The result is that loan rates would increase by 20 basis points for a 4 percentage point increase in capital requirements (from 6% to 10% increase in equity) across banks that are different in size and across different products and loan customers. The author assumed that all the variables which affect the pricing of the loans can change (Elliott, 2010)⁷². Elliott noted that this amount of increase is not enough to

⁷⁰ The authors first measured the impact of a given increase in the ratio of equity to total assets on the weighted average cost of capital (WACC). The authors assumed that banks pass on any increase in their cost of capital to its customers through increasing the rate they charge on their loans (Kashyap et al., 2010).

⁷¹ The author defines the ratio of tangible common equity to total assets as the capital ratio (Elliott, 2009).

⁷² To estimate the impact of increased capital requirements on loan rates, Elliott uses a loan-pricing equation which considers the following variables: loan rate, costs of debt and equity, credit spread, administrative costs and other benefits banks enjoy from making the loan (Elliott, 2010). The equation is $L * (1-t) \geq (E * r_e) + ((D * r_d)$

cause competitive issues in the banking system (Elliott, 2010). In yet another paper, Elliott estimated that a 25% increase in capital requirements (from 5% to 25%) would increase the price of credit by 2 percentage points (Elliott, 2013).

Gregory et al. found that regulatory capital requirements influence bank decisions regarding the availability of credit for different sectors of the economy (Gregory et al., 2014). A first-year effect of an increase in capital requirements would lead to a decline in credit availability for commercial real estate, other corporations and household secured lending. However, in the long run, after three years, loan growth is expected to return (Gregory et al., 2014).

Schanz et al. conducted a long-run steady-state cost-benefit analysis of stronger capital requirements for the banking sector in England by using an accounting-based approach like previous studies⁷³ (Schanz et al., 2011). Firstly, the authors analysed the way higher capital requirements impact banks' financing costs and their lending spreads. Secondly, the authors analysed the pass-through costs of higher lending spreads from banks to households and firms and their effects on investment and GDP. Focusing on the cost-side, Schanz et al. found that, in the long run, a one percentage point increase in the capital ratio would increase lending spreads by 7.4 basis points (Schanz et al., 2011). An increase in lending spreads subsequently would increase the cost of funding for firms and households, which impacts their investments and, as a result, output. The assessments by Schanz et al. suggest that an increase of 7.4 basis points in lending spreads would permanently reduce the GDP by 0.04 percentage points (Schanz et al., 2011).

Barrell et al. estimated the long-run costs of tighter capital and liquidity requirements in the UK. The authors argue that the banking sector offsets the costs from tighter capital and liquidity requirements by increasing its lending spreads (Barrell et al., 2009). An increase in bank lending spreads has a negative impact on firms because it increases their costs of capital (Barrell et al., 2009). An increase in the cost of capital of firms negatively affects the GDP. Additionally, the welfare and consumption of households is negatively affected due to tighter capital and liquidity

+ C + A – O) * (1-t) where L is the effective interest rate on the loan, including the annualized effect of fees, t is the marginal tax rate for the bank, E is the proportion of equity backing the loan, r_e is the required rate of return on the marginal equity, D is the proportion of debt and deposits funding the loan, assumed to be the amount of the loan minus E, r_d is the effective marginal interest rate on D, including indirect costs of raising funds, such as from running a branch network, C is the credit spread, equal to the probability-weighted expected loss, A is the administrative and other expenses related to the loan, O symbolizes other offsetting benefits to the bank of making the loan" (Elliott, 2010, p. 22).

⁷³ Accounting-based approaches were used in studies by Elliott and King (Elliott 2009, 2010; King, 2010).

requirements, but the authors note that the reduction in consumption by households does not have any negative impact on GDP (Barrell et al., 2009). The authors estimated the effects of tighter capital and liquidity requirements on bank borrowing costs and the “user cost of capital”. The authors found that, in the long run, a one percentage point increase in capital and liquidity requirements would increase the “user cost of capital” by 0.85 percent and would decrease the UK GDP by 0.12 percent. Overall, the authors argue that an increase in capital and liquidity ratios by one percent would reduce the UK GDP by 0.08 and 0.03 percent, respectively, in the long run (Barrell et al., 2009).

Miles et al. conducted a cost benefit analysis when banks significantly increase the amount of equity in their balance sheets (Miles et al., 2011). The authors found that, in the long run, the private costs of substantially higher capital requirements would not be so large. More specifically, the authors estimated that a twofold increase in capital ratios would increase bank funding costs by an average of 10 to 40 basis points. The authors assumed that banks pass on all the increase in their funding costs to their customers by increasing their lending spreads. As a result, the cost of funding for bank customers increases similarly by 10 to 40 basis points. Additionally, the authors estimated that the GDP loss from a 100% increase in capital ratios would be 6% of the current annual GDP⁷⁴ (Miles et al., 2011).

Furthermore, an important consideration is the effect of stronger capital requirements on firms individually. Laerkholm-Jensen (Laerkholm-Jensen, 2013), using publicly available financial statements for 106,050 Danish firms for the period 2005-2011 and capital injunctions in 2010 and Q12011, attempts to estimate the impact of an increase in capital requirements for Danish banks on sales growth of Danish firms due to the lending relationship that exists between the firm and the bank. The author found that increased capital requirements would reduce sales growth for Danish firms and particularly for small and young firms (Laerkholm-Jensen, 2013). Additionally, the author found that capital-constrained banks in Denmark transmit the costs of increased capital ratios to their clients, through an increase in interest payments for firms, with younger firms bearing most of the consequences. Moreover, firms holding higher amounts of short-term debt would be negatively affected by an increase in capital requirements because

⁷⁴ Miles et al. express GDP losses as the “present value of all lost GDP out to infinity expressed as a percentage of current annual GDP” (Miles et al., 2011, p. 24).

banks subject to increased capital requirements would be unwilling to refinance those loans on the same conditions (Laerkolm-Jensen, 2013).

Wurgler and Baker, using data for US bank stocks and returns during the period from 1971 to 2011, showed that the MM narrative does not hold for banks due to low risk anomaly (Wurgler & Baker, 2013). The low risk anomaly is a pattern where the low equity beta banks outperform the high equity beta banks (Wurgler & Baker, 2013). As a result, a low risk bank has a higher cost of equity than a high risk bank. Under the assumption of riskless debt, the authors estimated that the cost of capital could be raised up to 90 basis points given a 10% increase in the ratio of Tier 1 capital to RWA. As a result of higher costs in bank capital, the authors argue that many businesses would move to the SBS, which enjoys a less regulated environment (Wurgler & Baker, 2013). The authors focused exclusively on the entrepreneurial costs of stronger capital requirements and not on societal costs.

In his article in Bloomberg titled *Capital Rules Aren't the Only Reason Banking is Boring*⁷⁵, Levine suggested a model for the changes in the banking system due to the new regulatory environment (Levine, 2015). The author argued that new regulatory requirements decrease profits for shareholders. Moreover, the author provided a chart of the profitability of the 5 biggest US Banks to examine how bank profitability is affected due to the crisis. Levine concluded that the profitability of US banks declined substantially after the outburst of the crisis. The following chart depicts Levine's results regarding the profitability of the 5 largest

⁷⁵ See the following article: Levine, M. Capital Rules Aren't the Only Reason Banking Is Boring (2015, February 20). *BloombergView*. Accessed 09 April 2015. Retrieved from <http://www.bloombergview.com/articles/2015-02-20/capital-rules-aren-t-the-only-reason-banking-is-boring>.

US

banks.

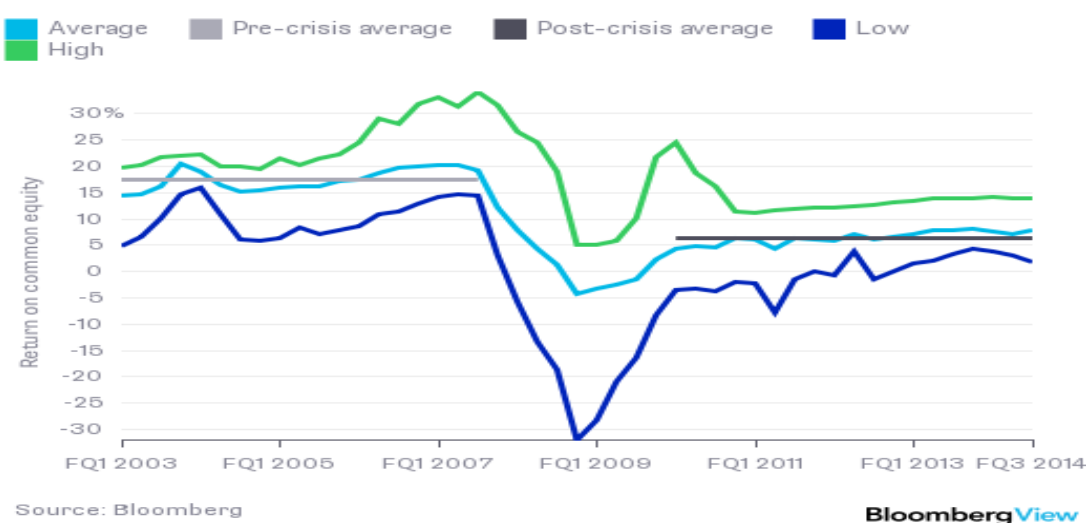


Chart 2. ROE for the 5 largest US banks during Q1 2003 until Q3 2014 (Source: Levine, 2015)

Additionally, the author explained whether the decrease in the profitability of US banks could be interpreted by an increase in capital requirements. Levine found that bank capital in US banks has increased by one third after the crisis (Levine, 2015). The following chart depicts the path of US bank capital measured as common equity to total assets from Q12003 to Q32014. It can be deduced from Chart 3 that the average ratio of bank capital to total assets was 6.7 percentage points before the crisis and 8.9 percentage points after the crisis (Levine, 2015).

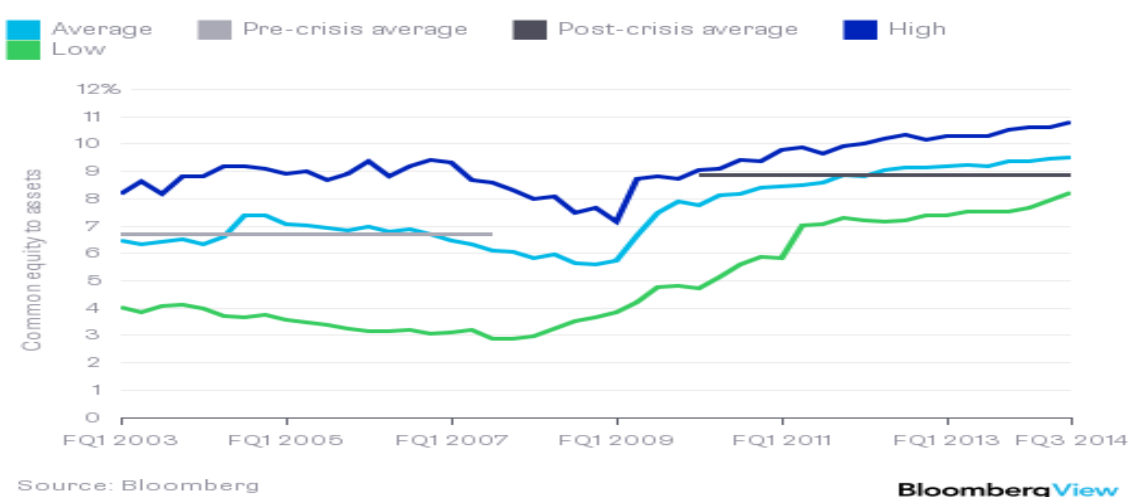


Chart 3. Common equity to total assets for US banks from Q1 2003 to Q3 2014 (Source: Levine, 2015)

Levine identified one reason to explain the fall in the profitability of US banks as the fall in the banks' return on assets (ROA). The author noted that the ROA declined substantially from an average of 1.1 percent before the crisis to an average of 0.8 percent after the crisis (Levine, 2015). The following chart depicts the decline in the ROA more clearly.

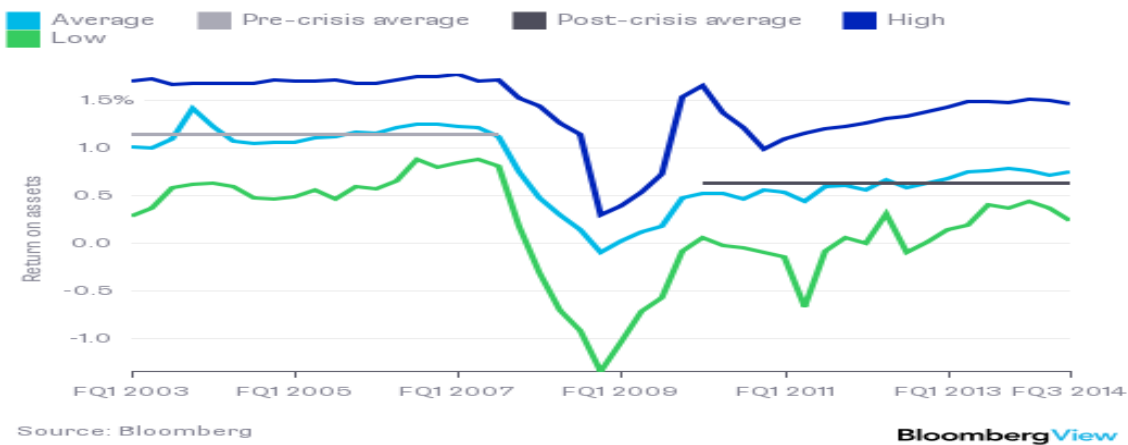


Chart 4. ROA for the US banks during Q1 2003 until Q3 2014 (Source: Levine, 2015)

Overall, Levine found that the decline in the profitability of US banks can be explained by “2/3 in the decline of banks' return on assets and by 1/3 in capital increases” (Levine, 2015). Finally, the author concluded that the aim of banks in the future is to “maximize returns on capital” by making their businesses more regulatory-friendly (Levine, 2015).

Another important rationale regarding the impact of capital requirements on the banking sector is given by Diamond and Rajan (Diamond & Rajan, 1999). The authors developed a model with which they attempted to answer the research question of whether bank capital is expensive. Their answer was mainly that the effects of capital requirements on lending are non-linear. In their model, deposits play a disciplinary role for bankers, since they oblige bankers to collect rents from borrowers - otherwise a bank run may ensue. The authors found that increased capital requirements would reduce the amount of deposits in a bank and, as a result, would lessen the discipline imposed on bankers to extract rents from borrowers. In essence, they reduce liquidity creation (Diamond & Rajan, 1999). Additionally, the authors argued that higher bank capital requirements would reduce credit intermediation and may even cause a bank run (Diamond & Rajan, 1999).

In an article on Project Syndicate, Raghuram Rajan⁷⁶ discussed the conflicts between bank managers and society regarding bank capital regulation (Rajan, 2013). Rajan claimed that arguments that support a substantial increase in capital requirements do not take into account the disciplinary role of debt which commits bank managers to take “appropriate” risk management decisions (Rajan, 2013). However, the author claimed that bankers’ persistence on high levels of debt or extreme levels of leverage do not take into account that such high levels increase the probability of a bank default and, thus, endanger the financial system. Rajan believes that the optimal solution regarding the discussion of bank capital regulation might be, as he defines it, a “moderately leveraged bank” (Rajan, 2013).

Hahn and Hölzl developed an empirical framework based on data for capital-constrained Austrian Banks to answer the research question “Does capital make bankers more complacent?” (Hahn & Hölzl, 2014). The authors used data for 281 small and medium-sized banks in Austria from 1995 to 2012 that were not included in M&A transactions and that do not have a “typical capital structure” (Hahn and Hölzl, 2014). The authors defined the effort of bankers as the ratio of credit to total liabilities. Additionally, complacency is measured as the choice of bankers to invest in non-credit assets, which do not require effort from their side compared to credit creation. The authors found that higher capital requirements would have a non-linear effect on the incentives for credit creation among bank managers (Hahn and Hölzl, 2014). More specifically, higher capital requirements would negatively affect the incentives of bank managers to engage in credit creation in high performance banks and, therefore, credit creation would be reduced for banks of this type. Conversely, higher capital requirements would positively affect the incentives of bank managers in low-performing banks to engage in credit creation and, therefore, credit creation would increase in this case (Hahn and Hölzl, 2014)⁷⁷.

In this part of the Master Thesis, the societal and entrepreneurial costs of increased capital requirements were examined. Initially, this chapter presented arguments by the academic and professional industry as to why higher equity requirements in banking are viewed as costly. As it can be concluded from this chapter, tighter regulatory rules would increase funding costs for banks, which would subsequently lead to an increase in lending rates, as well as to a reduction in the availability of credit. Banks prefer to pass on those effects to borrowers. As a result, the

⁷⁶ See the following article: Rajan, R. Love the Bank, Hate the Banker (2013, March 27). *The Project Syndicate*. Accessed 09 April 2015. Retrieved from <https://www.project-syndicate.org/commentary/the-inherent-tradeoffs-of-bank-regulation-by-raghuram-rajana>.

⁷⁷ The performance of banks is measured by bankers’ efforts to create credit (Hahn & Hölzl, 2014).

increases in lending spreads would negatively affect the borrowing costs of households and firms, with negative repercussions for the economy. Additionally, findings have shown that numerous jobs would be lost due to a stronger regulatory environment. Furthermore, it was found that higher capital requirements are partially responsible for the decline in the profitability of banks. Moreover, there are concerns that higher capital requirements would move the banking business from the regulated to the unregulated banking sector. Finally, this chapter offered a detailed analysis of the societal and entrepreneurial costs of increased capital requirements in banking.

Chapter 5. Are the societal and entrepreneurial costs of increased capital requirements in banking greater than the benefits?

This chapter is going to discuss the main research question of this Master Thesis, which is “Do the societal and entrepreneurial costs of increased capital requirements in banking overcome the benefits?” The main arguments for and against increased capital requirements are the necessary tools used in this chapter in order to answer the research question of this Master Thesis.

Those who oppose higher capital requirements provide arguments which usually claim that higher equity requirements in banking are “expensive” (Admati et al., 2011). However, Admati et al. characterize all those arguments based on the view that “equity is expensive” as *fallacies, irrelevant facts and myths* (Admati et al., 2011). The authors mention in their paper that this type of notion against increasing equity levels which exists among bankers has encouraged them to operate with very low levels of equity. In fact, in the years leading to the financial crisis of 2007-2008, many banks operated with a ratio of equity to total assets equal to 3 percent or less (Admati et al., 2011). The authors argue that, when banks possess such a low ratio of equity to total assets, then a modest loss incident could easily wipe out equity and, as a result, the financial system is in danger. The authors claim that increasing capital requirements entails no societal costs but only massive benefits. The Economist supports the view that higher capital requirements would not be costly even for banks. The idea is that well-capitalized banks could maintain their lending business during recessions. However, those that are not adequately capitalized would be close to insolvency (The Economist, 2013).

The first argument against increasing capital requirements in banking is that higher bank capital requirements lead to a decrease in the main businesses of banks, which are the provision of loans and the acceptance of deposits. Admati et al. prove that higher equity requirements could be achieved without any impact on bank lending. The authors believe that there are two ways for banks to raise their equity levels, which would not disrupt their main business, i.e. the acceptance of deposits and the provision of credit. First, banks could substitute long-term liabilities with equity. Second, banks could increase the size of their balance sheets. The

following figure depicts 2 strategies proposed by Admati et al. through which increased capital requirements could be met without any effects on bank lending (Admati et al., 2011).

Initial Balance Sheet		Revised Balance Sheet with Increased Capital Requirements			
Loans: 100	Equity: 10	Loans: 50	Equity: 10	Loans: 100	Equity: 20
	Deposits & Other Liabilities: 90		Deposits & Other Liabilities: 40		Deposits & Other Liabilities: 80
		A: Asset Liquidation		B: Recapitalization	
Loans: 100	Equity: 10	Loans: 100	Equity: 10	New Assets: 12.5	Equity: 22.5
	Deposits & Other Liabilities: 90		Deposits & Other Liabilities: 90	C: Asset Expansion	

Figure 4. Alternative responses to increased capital requirements (Source: Admati et al., 2011)

Admati. et al. initially assume a capital requirement of 10%. Additionally, they assume a balance sheet which, in the beginning, consists of \$100 assets, \$90 deposits and liabilities and \$10 equity (Admati et al., 2011). The authors assume a 10% increase in capital requirements, of which are 20% of total assets. Figure 4 presents 3 strategies to meet the capital requirement of 20% of total assets. In the first strategy, the bank engages in a compression of its balance sheet by reducing both its assets and liabilities. It is clear from Figure 4 that, in this case, the overall availability of credit is lower than it was initially. In other words, the bank sells a portion of its loans and uses the proceeds to reduce its liabilities. In the second strategy, banks achieve higher capital requirements by issuing new equity and using the proceeds to reduce their long-term liabilities and, more specifically, their long-term debt. This strategy does not impact the main functions of banks, which are to provide loans and to receive deposits and which are valuable for society (Admati et. al., 2011). In the third strategy, banks issue new equity and use the proceeds to acquire “new assets” that are very liquid. Through this strategy, banks are able to increase their lending business by liquidating the newly acquired assets to provide loans (Admati el. al., 2011). Overall, the last 2 strategies show that there are ways to meet increased capital requirements without any impact on credit creation for the economy (Admati et. al., 2011).

Those who oppose higher capital requirements usually argue that, with higher capital requirements, the returns for equity holders would be lower (Admati et al., 2011). As seen in figure 3, high bank capital requirements would lead to low ROE levels in good scenarios when ROA is high, while they would lead to high ROE levels when ROA is low. Admati et al. claim that there would be no loss in shareholders' value when banks increase their capital ratios (Admati et al., 2011). In this case, shareholders would be compensated by a reduction in the probability of facing losses when they invest in a better capitalized bank. As a result, they would require a lower return to invest in a bank with higher capital levels due to the fact that they face less risk (Admati et al., 2011). Additionally, Admati et al. argue that ROE is not an adequate measure of a bank's profitability, especially if banks have different capital structures, because ROE fails to consider both bank's risks and capital structure (Admati et al., 2011). Going back to figure 3, it can be deduced that, for banks with different capital structures, ROE cannot be used as a measure of their profitability. A clear example provided by Admati et al. is the following: In figure 3 it becomes obvious that, when the ROA is 7%, then with 20% capital the ROE is 15%. However, when the ROA is 6.5%, then with 10% capital the ROE is 20%. This leads to the conclusion that, for different capital structures, a high ROE for a bank does not mean that this bank uses its resources more productively (Admati et al., 2011).

Those who argue against higher bank capital requirements claim that, with higher capital requirements, the total funding costs for banks would increase, as banks use more equity in their capital structure, which is costlier than debt. Admati et al. argue that the increase in total bank funding costs when banks use more and costlier equity than debt would be offset by a reduction in risk premium required both by debt and equity holders to invest in a safer bank (Admati et al., 2011). Modigliani and Miller argue that, when there are no preferable tax treatment and public subsidies on debt, an increase in the amount of equity would lead to a re-distribution of total risk born by investors, and if investors price risks correctly, then the total funding costs of banks would not change. As a result, increased equity levels would not raise the total funding costs of banks (Modigliani & Miller, 1958).

The asymmetry of information between bank managers and investors lends credence to the arguments of costly higher bank capital requirements. As mentioned in Chapter 4, due to the asymmetry of information between bank managers and investors, banks respond to an increase in capital ratios by reducing their lending business (Admati et al., 2011). Admati et al. admit that an equity issuance would be more costly due to the asymmetry of information. However, they do not support the notion that banks should remain highly leveraged, because an increase

in the equity ratio through an equity issuance would be expensive (Admati et al., 2011). Admati et al. claim that better capitalized banks do not need to issue new equity, which is regarded as expensive due to the asymmetry of information between bank managers and investors, since those banks have less leverage and do not pay out large amounts to satisfy the claims of debt holders (Admati et al., 2011). Such banks could make use of their retained earnings which are higher compared to a highly leveraged bank to fund their operations (Admati et al., 2011). Moreover, if a bank decides to issue equity, the cost of this issuance decreases when the bank is better capitalized⁷⁸. Additionally, the authors argue that a new transparent mechanism, where regulators would “force” banks to issue new equity, based on an announced schedule, responds better to the problem of increasing equity capital requirements through an equity issuance. Moreover, Elliott argues that the appropriate solution to the problem of the asymmetry of information would be the enforcement of minimum capital ratios relative to a bank’s size (Elliott, 2013).

Chapter 4 of this Master Thesis discussed the argument that higher capital requirements in banks would increase their borrowing costs because banks cannot borrow at favourable rates supported by a favourable tax system and government guarantees (Admati et al., 2011). Taxes and government guarantees are two reasons why banks engage in high levels of leverage. Admati et al. argue that high levels of leverage are not optimal either from a social or from a private perspective. High levels of leverage are not socially optimal because banks choose to engage in high levels of leverage in order to take advantage of tax subsidies and government guarantees, ignoring the costs that high leverage levels impose on society. Additionally, high levels of leverage are suboptimal for different types of investors in a bank (Admati et al., 2011). Admati et al. argue that managers undertake new financing decisions by considering the benefit of equity holders and not that of debt holders (Admati et al., 2011). This happens because the performance of managers is based on the ROE (Admati et al., 2011). Admati et al. underline that such type of decision-making by managers dilutes the value of existing debt holders (Admati et al., 2011). Furthermore, the current tax system enables banks to save money when they are highly leveraged because the interest paid on debt is a tax-deductible expense. When banks reduce their leverage, they reduce the tax savings coming from interest paid on debt. Moreover, through government guarantees, banks take advantage of the ability to borrow at low

⁷⁸ This argument is clear if we study figure 3, where the sensitivity of the ROE to the ROA is lower with higher capital levels (20% capital) than with lower capital levels (10% capital).

rates because bank creditors anticipate that government guarantees would protect them should the bank default (Admati et al., 2011). Higher capital requirements would make the private sector more responsible for bearing the costs of a bank failure rather than relying on the government (Admati et al., 2011).

An additional reason why increased capital requirements in banking are considered costly concerns the disciplinary role of debt. Rajan claims that debt disciplines managers to take appropriate risk management decisions (Rajan, 2013). Debt removes moral hazard in banking (Admati et al., 2011). As a result, the argument is that when banks use higher capital ratios and lower debt ratios, this would reduce the disciplinary role of debt and would lead to ineffective governance mechanisms (Admati et al., 2011).

However, Admati et al. also question the disciplinary role of debt by providing a number of arguments. Firstly, the authors claim that high leverage gives incentives to banks to take excessive risks. Secondly, the authors believe that the disciplinary role of debt cannot be justified by the events of the recent financial crisis, where banks engaged in higher levels of leverage⁷⁹. Thirdly, the authors support the view that models that examine the disciplinary role of debt disregard the disciplinary role of equity or “alternative governance mechanisms”⁸⁰. As long as debt holders expect to receive their claims, they do not have any incentive to collect information regarding the performance of the firm. Conversely, equity holders with a claim that is continuously re-priced in financial markets are better incentivized to monitor bank activities and their riskiness than debt holders. Lastly, discipline relying on short-term debt that should be often renewed induces fragility. When a bank is insolvent or close to insolvency, then fears among lenders to be the first in line and take their claims induce a bank run. Given that a bank’s assets are illiquid, such a run might lead to an inefficient liquidation. As a result, the claims of short-term lenders can be particularly costly for the bank (Admati et al., 2011).

⁷⁹ Indeed, the authors argue that in the years leading to the financial crisis there was a substantial increase of short-term funding in the form of repos. As the crisis unfolded, short term funding was withdrawn. Those withdrawals were mainly affected by public information and not by the effective monitoring of short-term lenders. An example given by the authors is the disappearance of conduit refinancing via asset-backed commercial paper, which was enhanced by downgrades of mortgage backed securities (MBS) and collateralized debt obligations (CDOs) from rating agencies, as well by insolvencies of 2 hedge funds of Bear Sterns (Admati et al., 2011).

⁸⁰ An example of alternative governance mechanisms proposed by Admati et al. is the creation of the equity liability carrier. An equity liability carrier is an independent entity, which can be responsible for holding bank equity, as well as additional equity amounts with independent management from that of the bank. This structure will enhance monitoring and efficient management in a bank (Admati et al., 2011).

Chapter 5 discussed the argument that higher bank capital requirements would lead to a reduction in the credit provision by banks, which will negatively impact economic growth. Admati et al. identify 2 types of arguments. Firstly, undercapitalized banks reduce lending to meet higher bank capital requirements. Secondly, higher capital requirements would lead to stricter lending criteria (Admati et al., 2011). Admati et al. prove that banks could meet higher capital requirements without reducing their lending business (Admati et al., 2011). Additionally, the authors argue that better capitalized banks would make better lending decisions and would have lower credit costs because they can finance those loans with their own funds (Admati et al., 2011).

Chapter 4 of this Master Thesis discussed the argument that high levels of debt constitute the optimal way of financing for the banking system and an increase in equity requirements entails large private and social costs. The Economist reports that, based on book value ratios, less leveraged banks are perceived as safer by the equity markets compared to more leveraged banks. As a result, the funding costs of banks that are less leveraged and have increased equity capital requirements are lower compared to those that are more leveraged and have low equity capital levels⁸¹ (The Economist, 2013).

Diamond & Rajan argue that the optimal bank capital should be determined by considering 3 factors, namely, bank safety, the ability of the banking system to create liquidity and the disciplinary role of debt in bank management (Diamond & Rajan, 1999).

Chapter 3 of this Master Thesis noted that one benefit of stronger capital and liquidity requirements would be the reduction in the probability of future banking crises and their related costs. The benefits are measured as a reduction in the probability of future financial crises times the discounted present value of all expected losses stemming from future financial crises. The benefits are expressed in terms of their impact on GDP. Based on the literature used in Chapter 4, it was shown that higher bank capital and liquidity requirements increase the funding costs for banks, since banks substitute cheap debt with expensive equity as well as less liquid and risky assets with more liquid and less risky assets. An important assumption is that by increasing their lending spreads, banks pass on fully any increases of their costs to borrowers. An increase in bank lending spreads leads to an increase in the cost of capital for bank borrowers, which has

⁸¹ See the following article: Equity Capital Requirements. The people versus the bankers (2013, February 13). *The Economist*. Accessed 09 April 2015. Retrieved from <http://www.economist.com/blogs/freeexchange/2013/02/equity-capital-requirements>.

a negative effect on investment and consumption and, as a result, output (Schanz et al., 2011, Barrell et al., 2009). Taking the above findings into consideration, it can be deduced that tighter capital and liquidity requirements entail certain trade-offs. Higher bank capital and liquidity requirements would reduce the likelihood of future financial crises, but this should come at the cost of bank borrowers via an increase in their funding costs, which would negatively affect investment and consumption and, as a result, the productivity of the economy, which is expressed in terms of GDP. The next chapter conducts a cost-benefit analysis of tighter capital and liquidity requirements.

Chapter 6. A cost–benefit analysis

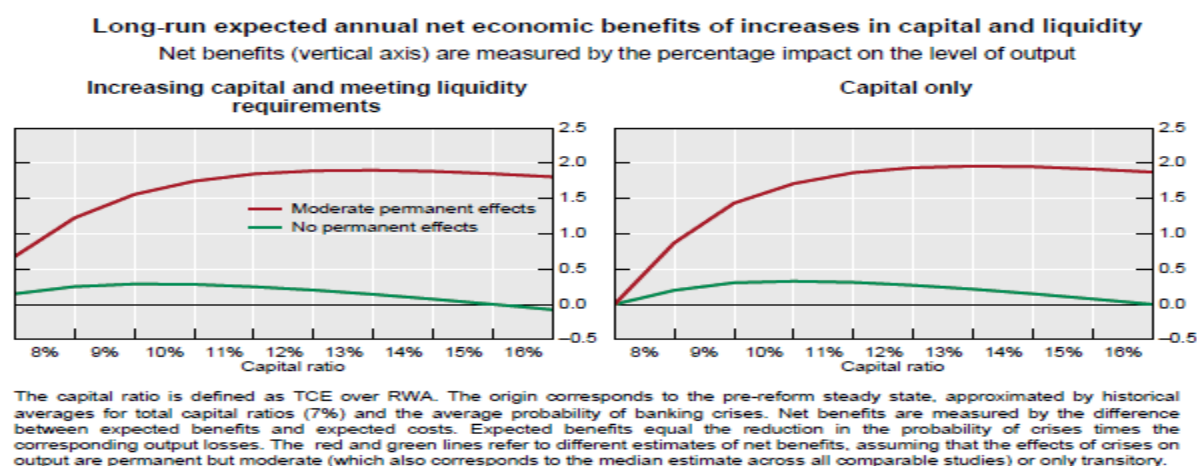
This chapter conducts a cost–benefit analysis of higher capital requirements based on the existing literature. This part of the Master Thesis measures the impact of stronger capital and liquidity requirements based on their effects on GDP.

The BCBS conducted a cost–benefit analysis of stronger capital and liquidity requirements (BCBS, 2010). The BCBS measured the benefits of regulatory requirements as the per year decline in the probability of a banking crisis multiplied by the present value of the permanent costs of a crisis which is assumed to hold for more than a year (BCBS, 2010). The costs of stronger regulatory requirements are expressed as the annual reduction in the level of GDP (BCBS, 2010). More specifically, total bank funding costs increase due to tighter regulatory requirements, because banks pass on those costs to customers through higher loan rates. As a result, higher loan rates have a negative impact on investment and consumption and, as a result, the economy (BCBS, 2010). To conduct a cost–benefit analysis, the BCBS focused on 2 estimates for the costs of banking crises. Firstly, the BCBS measured the costs of banking crises by assuming that they have permanent but moderate effects. Secondly, the BCBS measured the costs of banking crises by assuming that they have temporary effects (BCBS, 2010).

As noted above, the BCBS assumed that banks transfer all of the costs they face from having higher capital and liquidity ratios to their customers while they do not change their ROE levels, interest rates on deposits and administrative expenses (BCBS, 2010).

Graph 1 presents the results of the cost–benefit analysis of stronger regulatory requirements conducted by the BCBS (BCBS, 2010). The left-hand side presents the net benefits of stronger capital and liquidity requirements, while the right hand side presents the net benefits only from increased capital requirements. The red line in the graph illustrates the net benefits when the impact of a banking crisis on GDP is permanent but moderate. The green line in the graph illustrates the net benefits when the impact of a banking crisis on GDP is temporary. Overall, it can be concluded from graph 1 that stronger regulatory requirements have a positive impact on GDP over a wide range of capital ratios. In other words, even if a tighter regulatory environment is considered, this would be beneficial for the economy (BCBS, 2010). Additionally, it can be

seen from graph 1 that, when banking crises have temporary effects, the net benefits from tighter capital and liquidity requirements become negative when capital ratios exceed 15%. A similar picture appears if only increases in capital requirements are considered.



Graph 1. Long-run expected annual net economic benefits of increases in capital and liquidity ratios (Source: BCBS, 2010)

Schanz et al. conducted a cost–benefit analysis by considering only an increase in capital requirements (Schanz et al., 2011). Similarly to the approach by the BCBS (BCBS, 2010), the authors considered the effects of a percentage point increase in the capital ratio on GDP. Table 6 presents the cost–benefit analysis conducted by the authors (Schanz et al., 2011).

Table 6 Plausible bounds for appropriate capital requirements (Schanz et al. ,2011)									
	Marginal benefit (% of GDP)			Marginal cost (% of GDP)			Net benefit (% of GDP)		
Effects of an increase in the capital ratio...	low	mid	high	high	mid	low	low-high	mid	high - low
from 8% to 9%	192	459	726	-3	-2	0	189	457	726
from 11 % to 12 %	4	71	137	-3	-2	0	1	69	137
from 14 % to 15 %	0	3	5	-3	-2	0	-3	1	5

Table 6. Plausible bounds for appropriate capital requirements (Source: Schanz et al., 2011)

Table 6 presents the highest and lowest benefits and costs from a percentage point increase in capital ratios for banks in the UK. Additionally, the mid-column in table 6 illustrates average estimates. The results from the analysis conducted by Schanz et al. show that the optimal capital ratio ranges between 11% and 12% of RWAs, because, at this point, the pessimistic benefit

scenario outweighs the optimistic cost scenario. If average estimates (mid-column) for costs and benefits are considered, it can be seen from table 6 that the optimal capital ratio might be a little over 15% (Schanz et al., 2011).

Miles et al. estimate the optimal level of bank capital by considering the benefits and costs of higher bank capital requirements (Miles et al., 2012). The authors calculated both benefits and costs of stronger capital requirements as the present value of all future effects on GDP. The results from the cost benefit analysis are presented in the following tables.

Table 7. Optimal capital ratios considering full distribution of bad events (Miles et al., 2012)		
	Crises have some permanent effects on GDP growth	Crises have no permanent effects on GDP growth
Base cost of capital	19%	17%
Lower cost of capital	47%	18%
Higher cost of capital	18%	16%

Table 7. Optimal capital ratios considering the full distribution of bad events (Source: Miles et al., 2012)

Table 8. Optimal capital ratios ignoring the most extreme bad events (Miles et al., 2012)		
	Crises have some permanent effects on GDP growth	Crises have no permanent effects on GDP growth
Base cost of capital	19%	17%
Lower cost of capital	20%	18%
Higher cost of capital	18%	16%

Table 8. Optimal capital ratios ignoring the most extreme bad events (Source: Miles et al., 2012)

Table 7 presents the optimal bank capital ratios when considering large but rare GDP effects of banking crises, while table 8 does not consider those effects (Miles et al., 2012). Additionally, as can be seen from both tables, the authors estimated the optimal bank capital ratios by assuming that crises have permanent GDP effects and no permanent GDP effects, respectively (Miles et al., 2012). Moreover, the authors conducted their cost–benefit analysis by using 3 scenarios for the cost of capital. Firstly, in the high cost scenario, the authors assumed that the Modigliani–Miller theorem does not hold and additional taxes paid by banks to the government cannot be offset by lower taxes paid by bank equity holders on a personal level (Miles et. al., 2012). Secondly, in the base case, the authors assumed that any additional bank taxes are offset by lower corporate taxes and a 55% validity of MM theorem. Thirdly, in the low cost scenario, it is assumed that bank funding represents 16% of total business finance. It is illustrated in table 7 that, in the low cost scenario and when it is assumed that crises have permanent effects on output, then the optimal bank capital lies at 47% of RWAs. The authors report that this result

is particularly affected by the assumption that there is a likelihood that GDP and RWAs fall by 35% (Miles et al., 2012). The authors argue that the realization of such a scenario is uncertain. If the extreme scenario is excluded, it can be concluded from both tables 7 and 8 that the optimal level of bank capital lies in the range of 16% to 20% of RWAs. By comparing their results with the Basel III capital ratios⁸², Miles et al. argue that it might be reasonable to double capital ratios in the future (Miles et al., 2012). Additionally, they propose that capital requirements should be estimated as a proportion to un-weighted assets.

Barrell et al. conducted a cost-benefit analysis of stronger regulatory requirements for the banking sector in the UK (Barrell et al., 2009). The authors estimated the benefits and costs of stronger capital and liquidity requirements in terms of their impact on GDP in 2009. The authors measured the net benefits by using a net present value (NPV) formula which is the following:

$$NPV_j = \sum_{t=1} (b_{jt} - c_{jt}) / (1 + rr)^t ,$$

where j symbolizes the degree of a stricter regulatory environment, b_{jt} is the gross benefit of tighter capital requirements at time t , which is the product of a change in the probability of a financial crisis due to tighter regulatory rules times the costs of crisis, c_{jt} are the costs of tighter regulation that would be applicable in the beginning of 2007 in the UK and rr symbolizes the real discount factor which is assumed to be 3% (Barrell et al., 2009).

Figure 4 presents the main results of the cost-benefit analysis in the UK. As illustrated in figure 4, the authors estimated the net benefits when capital and liquidity requirements are increased by one, two, three, four, five, six and seven percentage points. Additionally, the authors assumed that, in the long run, output is reduced by 3% and every additional cost is considered in the case output is reduced by more than 3%. It can be easily discerned from the figure that, up to a 6 percentage point increase in capital and liquidity ratios, the benefits of increased capital and liquidity requirements outweigh the costs. It can also be seen in figure 4 that the greatest net benefit comes when capital and liquidity requirements are increased by 3% and, from this point on, the net benefits of tighter capital and liquidity requirements start to decline. When capital and liquidity requirements increase by 7 percentage points, the net benefits become negative. Overall, the authors argue that the benefits of tighter capital and liquidity requirements

⁸² The authors note that the Basel III minimum capital ratio expressed as common equity to risk-weighted assets is 7% (Miles et al., 2011).

outweigh the costs, under the consideration that tighter regulatory requirements would reduce the probability of banking crises (Barrell et al., 2009).

Cumulated gains as a proportion of GDP

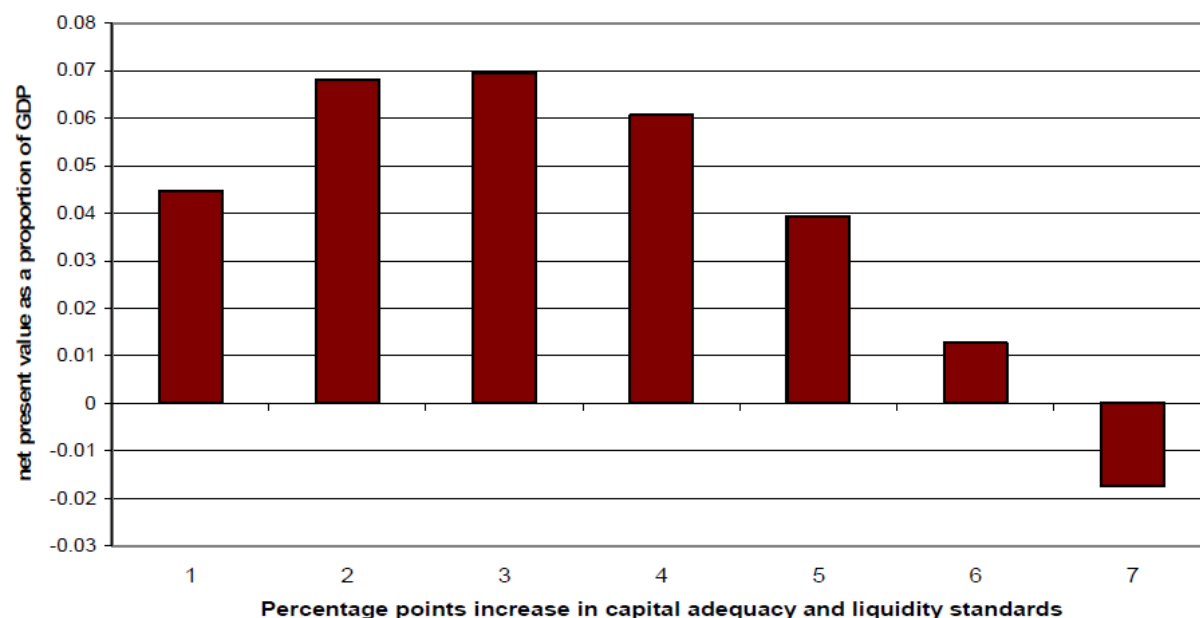


Figure 5. Cumulative output gains per percentage point increase in capital adequacy and liquidity standards (Source: Barrell et al., 2009)

Additionally, there are other scholars who argue that increased regulatory requirements would be beneficial when taking into consideration both the benefits and the costs of stronger capital and liquidity requirements. Elliott and Santos argue that the benefits of a reduction in the probability and severity of future financial crises due to a tighter regulatory environment will outweigh any costs in the long run (Elliott & Santos, 2012).

This chapter conducted a cost-benefit analysis of stronger capital and liquidity requirements in terms of their effects on GDP. Based on the literature used, it can be concluded that in the long run, the benefits of increased capital and liquidity requirements outweigh the costs. There is great room to increase capital requirements in the banking industry much more than what the Basel 3 accord requires. The main finding of this chapter is that an increase in capital and liquidity requirements yields positive net economic benefits in the long run.

Chapter 7. Proposals for better regulation in the banking industry

This chapter of the Master Thesis includes certain recommendations for improving the regulation of the banking system. Most of the proposals in this section are based on recommendations from renowned academic scholars in finance. In this chapter, the following topics are analysed: the need for a “systemic regulator” and for an appropriate mechanism to collect information about financial markets, contingent convertible securities (CoCos), resolution mechanisms, the regulation of over-the-counter (OTC) derivatives and the role of clearinghouses, recommendations for better regulating capital requirements and recommendations for reducing the dependence between politicians and bankers.

The recent financial crisis revealed major shortcomings regarding the functioning of the financial system. The Squam Lake Report identifies 4 major shortcomings in the financial system that contributed to the outbreak of the financial crisis⁸³ (French et al., 2010). The authors separate the shortcomings of the financial system into 4 categories which are: agency problems, new forms of bank runs, bankruptcy and resolution processes and that the regulatory structure was not ready to deal with complex financial developments. Furthermore, the authors state that the goal of regulation is to improve the stability of the financial system (French et al., 2010).

7.1. The need for a systemic regulator and for better information mechanisms for regulators

French et al. argue that regulation should focus primarily on the stability of the financial system, which will encompass the stability of individual institutions (French et al., 2010). Therefore, the authors highlight the need for a regulatory authority in each country that would monitor the safety and soundness of the financial system. Due to its political independence and its role to

⁸³ The Squam Lake Report is a report compiled by 15 renowned scholars with the purpose of offering recommendations towards a better regulatory environment (French et al., 2010).

preserve price stability, French et al. believe that the appropriate organization to undertake this role would be the central bank (French et al., 2010).

A regulatory environment with better access to information is another consideration of the report (French et al., 2010). The authors highlight the fact that, during the financial crisis, regulators lacked any information regarding systemic risk developments in the financial system. Moreover, the authors identify fire sale risk and counterparty risk as responsible for causing systemic risks in the financial system⁸⁴. As a result, authorities need to gather information about those risk types for each type of institution. The authors identify two sources where regulators can collect information, which are “derivative positions” and “more general asset positions”. Overall, the authors recommend quarterly provision of information to regulators regarding asset positions and other risks, the encouragement of information-sharing across agencies, a standardized methodology to estimate exposures and to conduct valuations, the disclosure of regulatory information to the public and the responsibility of the regulator to compile a risk-related report for the government every year (French et al., 2010).

7.2. Contingent convertible securities (CoCos)

French et al. suggest a new type of hybrid security called contingent convertible securities (CoCos) in order to reduce the societal impact of the financial crisis. CoCos are a type of security which has primarily debt-like characteristics, but is, under certain conditions, transformed into equity (Avdjiev et al., 2013)⁸⁵. A specific trigger that enables conversion is “when a bank’s capital falls below a certain amount” (Avdjiev et al., 2013, p. 43). The idea behind CoCos is that it is bank investors and not taxpayers who should bear the burden of bailing out a distressed financial institution (French et al., 2010). As a result, CoCos can be considered as a way of recapitalization of a distressed financial institution which does not cause any costs to taxpayers (French et al., 2012). Admati et al. question the ability of CoCos to act as a loss-absorbing security during a crisis and argue that such instruments would not bring

⁸⁴ Counterparty risk is the risk that a counterparty defaults and does not fulfill its obligations, while fire sale risk is the risk that a price of a security drops below its “fair” value (French et al., 2010).

⁸⁵ For a detailed explanation of CoCos see the paper by Avdjiev et al. (Avdjiev et al., 2013).

anything to the financial system compared to cases where banks would hold increased amounts of equity (Admati et al., 2010).

7.3. Regulating executive compensation

Due to the recent financial crisis, regulatory attention has been diverted to the level of compensation bank managers receive⁸⁶. During the crisis, it was proved that, despite the high levels of compensation, bank managers undertook risky strategies which later failed. As a result of failed strategies pursued by bank managers, losses materialized and in the end governments had to save the failed institutions by infusing staggering amounts of taxpayer money. In general, the financial system functioned in a way where private losses were undertaken by society while bank managers and shareholders suffered no consequences for their risky strategies. This environment creates a conflict of interest between society on the one side and managers and shareholders on the other (French et al., 2012).

French et al. argue that, due to bank managers' specific skills, the amount of executive pay should not be the focus of regulators (French et al., 2010). However, the authors are of the view that regulation should focus on the "structure of executive compensation" (French et al., 2010, p. 50). As a result, the authors recommend that regulators should let the level of compensation be determined by the market.

French et al. support the view that executive compensation should change so that bank managers face the consequences of their risky strategies (French et al., 2010). The authors suggest that a portion of executive compensation per year should be withheld over a period of 5 years and, provided the bank hasn't received any guarantees or declared bankruptcy, these amounts would be returned to executives⁸⁷ who would otherwise lose them. The authors believe that harmonization of incentives between bank management and society would be achieved through this compensation scheme.

⁸⁶ See the following article: Pay and the Financial Crisis. Questions of Equity (2008, September 25). *The Economist*. Accessed 30 March 2015. Retrieved from <http://www.economist.com/node/12304785>.

⁸⁷ French et al. suggest that the amounts to be withheld to be equal to 20% of annual payments to every senior manager (French et al., 2010).

7.4. Resolution mechanisms

A regulatory challenge faced by the banking industry has to do with the resolution of systemically important financial institutions (SIFIs). Regulators face numerous legal challenges when it comes to resolution mechanisms for such institutions⁸⁸. French et al. suggest that regulators should be given the authority to implement an effective resolution procedure. As a result, the authors propose that SIFIs should compile a plan for their relief in case they become financially distressed and submit that plan on a quarterly basis to the regulator. These “resolution plans” are called “living wills”. Through such resolution plans, the regulator would acquire a better understanding of the problems that might come up in case SIFIs find themselves in financial distress and need to enter a resolution procedure (French et. al., 2010). If a SIFI does not submit a resolution plan that is “acceptable” from a regulatory point of view, then the regulator would have the right to impose penalties on those institutions (French et. al., 2010). Moreover, the authors suggest that the longer the resolution procedure of a SIFI, the larger the amount of capital or “the fraction of liabilities” that the institution needs to hold. French et al. argue that this would promote a less complex “organizational and contractual” structure for banks that would be resolution-friendly (French et al., 2010). Moreover, the authors support cooperation between countries regarding resolution procedures. Finally, French et al. recommend that SIFIs need to note in their “living wills” how they are going to deal with “executory contracts”⁸⁹.

7.5. OTC derivatives and clearinghouses or Central Counterparties (CCPs)

Apart from transactions being conducted in organized exchanges, there are also transactions that occur between 2 parties without the need of an organized exchange. Such transactions are characterized as *over-the-counter*. As a result, OTC derivatives are simply derivative transactions being conducted in unregulated markets. The Economist reports that in June 2011,

⁸⁸ French et al. outline all the difficulties being faced by regulators regarding the resolution of SIFIs (French et al., 2010).

⁸⁹ Executory contracts are contracts that enjoy a favorable treatment when a bank enters a process of bankruptcy. Over-the-counter derivatives and repos are such types of contracts (French et al., 2010).

the overall amount of OTC derivative contracts was approximately \$700 trillion⁹⁰ (The Economist, 2011). The recent financial crisis proved that OTC derivatives are a major source of systemic risks and can cause immeasurable costs to society⁹¹. To counter the systemic risks stemming from derivative contracts and, more specifically, from OTC derivative contracts, regulators have suggested the introduction of clearinghouses. Clearinghouses can be defined as intermediaries in over-the-counter derivative transactions which act as a buyer to every seller and vice versa (Gregory, 2010, p. 396). As clearinghouses possess enough capital on their balance sheets, their role is mainly to protect the financial system from systemic risks being caused by a failure of a party in a derivative transaction to meet the terms of the contract. Additionally, French et al. argue that clearinghouses could reduce the amount of losses a counterparty can suffer in a derivative transaction. Moreover, the authors note that collateral requirements for derivative transactions being cleared via a clearinghouse are lower compared to derivative transactions which are not cleared via a clearinghouse (French et al., 2010).

Additionally, French et al. argue that there is a risk of clearinghouses, influenced by their quest for profit, engaging in inappropriate actions that would enhance the propagation of risks (French et al., 2010). As a result, regulators should ensure that clearinghouses are “appropriately capitalized, they demand sufficient collateral from their customers and they are subjected to harsh controls of their operations” (French et. al., 2010, p. 68). Moreover, the authors encourage the financial industry to use clearinghouses as a mechanism to reduce risks that lie in their derivative transactions. Additionally, the authors recommend that institutions that do not clear their derivative transactions should be subjected to higher capital requirements.

Despite the benefits mentioned, the introduction of clearinghouses in the regulation of derivative transactions also entails risks. The Economist highlights the fact that, in recent years, trades cleared via CCPs have increased substantially (The Economist, 2012). More specifically, The Economist reports that deals valued at approximately €800 million are being cleared by LHC.Clearnet, a clearinghouse in the UK (The Economist, 2012). Additionally, many clearinghouses located in different countries merge to increase their businesses⁹². Thus, The

⁹⁰See the following article: Centrally Cleared Derivatives. Clear and Present Danger (2012, April 4). *The Economist*. Accessed 30 March 2015. Retrieved from <http://www.economist.com/node/21552217>.

⁹¹ See the following article: AIG's Rescue. Size Matters (2008, September 18). *The Economist*. Accessed 09 April 2015. Retrieved from <http://www.economist.com/node/12274070>.

⁹² The Economist refers to the merger of NYSE Euronext with Deutsche Börse, which created the biggest German clearinghouse, Eurex Clearing. See the following article: Centrally Cleared Derivatives. Clear and Present Danger

Economist notes that, in the future, only few yet large CCPs would exist, engaging in numerous “cross-country” activities and, as a result, risk would be concentrated only in those institutions. However, regulators need to clarify who will be responsible for the “bailout” of such institutions, since this responsibility is not only the responsibility of a national regulator. The second issue is that as deals cleared via CCPs increase, there would be a need to find suitable collateral for those deals (The Economist, 2012). This “pressure for suitable collateral” might lead to a situation where CCPs might accept “not stable assets” as collateral (The Economist, 2012)⁹³.

Regarding the regulation of the derivatives market, Admati & Hellwig support the view that clearinghouses might not be the appropriate solution to regulate the derivatives market (Admati & Hellwig, 2013). The authors argue that clearinghouses are a new form of SIFIs that enhance the interconnectedness of the financial system because they usually belong to “regulated banks”. The authors believe that an alternative to clearinghouses would be a regulation that will “force” more types of derivative transactions to be executed in organized exchanges (Admati & Hellwig, 2013).

7.6. Capital requirements

The third chapter of this Master Thesis contained an outline of arguments regarding the need of the banking system to guard itself with higher capital requirements. When banks have higher capital requirements, they are better equipped with the necessary tools to absorb losses arising from severe crisis situations (French et al., 2010). The authors suggest that capital requirements should be adjusted according to the size of the financial institution, meaning that larger financial institutions should “bear” higher capital ratios and vice versa. The logic behind this proposal is that a failure of a large financial institution creates higher systemic risks compared to many smaller financial institutions, because a large bank holds large positions that undergo large price adjustments in case a bank faces financial difficulties, with negative repercussions on other banks (French et. al., 2010). However, if the same amount of positions held by a large bank

(2012, April 4). *The Economist*. Accessed 30 March 2015. Retrieved from <http://www.economist.com/node/21552217>.

⁹³ The Economist notes “As more deals migrate to CCPs, the pressure to find suitable collateral could intensify (by how much depends on the extent to which clearing enables offsetting transactions to reduce the amount of collateral needed). There is a risk that clearing-houses could expose themselves to assets which are not as stable as they should be”. See the following article: Centrally Cleared Derivatives. Clear and Present Danger (2012, April 4). *The Economist*. Accessed 30 March 2015. Retrieved from. <http://www.economist.com/node/21552217>.

were distributed to many small banks, systemic concerns would be less severe because in this case, there is a possibility that certain banks could survive - if no bank survives, bank failures would not happen simultaneously and this would give the time flexibility to the financial system to absorb the incurred losses (French et al., 2010). In sum, if “risky positions” were held by many small banks instead of a large bank, systemic risks would be reduced substantially (French. et al., 2010). As a result, large banks imposing higher systemic risks to the financial system should be subjected to higher capital requirements (French, et. al., 2010).

Another recommendation made by French et al. is that banks with a large amount of liquid assets should hold fewer capital requirements than banks which hold fewer liquid assets (French et al., 2010). The reason is that a liquid asset can be sold at any time without any loss in its value even when a bank wants to “sell this asset quickly”, while a quick sale of an illiquid asset requires price adjustments, which is a source of systemic risk (French et al., 2010).

Moreover, the authors argue that capital requirements should increase according to the ratio of short-term debt of the company. Despite the disciplinary role of short-term debt in principal-agent problems, it could be also a source of systemic risk (French et al., 2010). The reason is that, in the case that bank assets mature in the long run, a higher proportion of short-term debt in a bank’s balance sheet increases the risk that the bank would “have to sell illiquid assets during a financial crisis” to meet short-term debt repayments (French et al., 2010, p. 46). As noted before, the fire sale of illiquid assets would enhance the propagation of risks in the financial system.

Admati & Hellwig support an increase of equity requirements in the range of 20 to 30 percentage points⁹⁴ of total assets⁹⁵ as beneficial for the banking system and, most importantly, for society as a whole ⁹⁶ (Admati & Hellwig, 2013). The authors suggest policy

⁹⁴ Myerson proposes that capital requirements should not be expressed as a proportion of total assets, but as a proportion of total liabilities. According to Myerson, a recommendation of 20 percent capital to total assets could be translated into 25 percent capital to total liabilities (Myerson, 2014).

⁹⁵ Admati and Hellwig note that, in order to estimate the suggested amounts of new capital, one should not focus on the current size of the banking industry and on individual banks, because such sizes would not be beneficial for society (Admati & Hellwig, 2013). The authors argue that the proposed equity levels should be estimated based on a much smaller banking industry and much smaller individual banks.

⁹⁶ The authors believe that the risk-weighted asset approach used to determine bank capital ratios is flawed. In the risk-weighted asset approach, each asset is assigned a risk-weight based on its characteristics and for each asset, the bank assigns an appropriate equity amount required to absorb possible losses coming from that asset. However, this approach allowed banks to focus on assets that do not require a lot of capital and therefore bring their equity ratios to a small amount of total assets. Additionally, the authors question the methodology of using risk weights for all bank assets and note that this approach proved to be wrong, especially during the European

recommendations through which banks could increase their equity ratios and, as a result, the banking system could become much safer than it was prior the recent financial crisis.

Initially, the authors argue that regulators should restrict capital constrained banks from making any payments to shareholders and force them to retain their earnings so as to increase their capital ratios. Admati & Hellwig argue that banks could use their retained earnings to make profitable loans, to acquire “marketable securities” or to reduce their debt levels (Admati & Hellwig, 2013). Moreover, a restriction in the distribution of equity payouts to shareholders would increase the value of their shares in case a low-leveraged bank invests in profitable assets (Admati & Hellwig, 2013). Additionally, in the case of a high-leveraged bank, a ban on payouts would reduce the probability of default in this type of bank, because the bank would be able to pay its commitments to its creditors through resources from retained earnings (Admati & Hellwig, 2013). As a result, a reduction in the probability of bank default would also reduce the probability that the public will have to pay in case a bank fails (Admati & Hellwig, 2013).

Admati & Hellwig note that banks could increase their capital requirements through issuing new shares instead of using retained earnings. However, there are certain agency problems when banks need to issue new shares (Myers & Majluf, 1984). The authors argue that agency problems could be overcome if the process of issuing new equity would become more transparent. Therefore, the authors propose that, if regulators could dictate the issuance of new equity in banks when they are not adequately capitalized, this could alleviate such concerns. Moreover, the problem could be also overcome through a rights offering⁹⁷.

Finally, the authors believe that, if a bank could not increase its equity requirements through the above-mentioned ways, this could raise concerns about the solvency of the bank. In this case, a regulatory inspection of the bank’s viability would be required, and if a bank proves to not be viable, then regulators should allow the closure of the insolvent bank (Admati & Hellwig, 2013).

crisis. Moreover, the authors argue that risk weights were influenced by “politics, tradition, genuine and make-believe science and banks’ self-interest” (Admati & Hellwig, 2013, p. 184).

⁹⁷ Ramirez defines a rights offering as “the right for existing shareholders in a company to subscribe for specific number of new shares in proportion to their existing shareholdings, at a specified price during a specified period” (Ramirez, 2011, p. 87).

Moreover, Admati & Hellwig recognize the need for substantially higher equity requirements for systemically important financial institutions such as clearinghouses, market makers, investment banks and hedge funds (Admati & Hellwig, 2013).

7.7. The relationship between banking and politics

Politics and banking are strongly interconnected. The banking system provides substantial financial support to political parties⁹⁸. From their side, bankers want to affect political decisions to their own benefit through the financial support they provide to politicians (Admati & Hellwig, 2013). As mentioned in Chapter 4, many bankers were against an increase in capital requirements, claiming that such requirements would undermine economic growth. Politicians, apprehensive of breaking the relationship they have with bankers, align themselves with bankers' interests, but at the expense of society, which will bear any losses resulting from a failure of the banking system. Moreover, regulators and supervisors, from their side, are reluctant to set the "necessary rules" and to ensure their "effective enforcement" to achieve a more stable and safe financial system because they place their personal interests as well as the interests of particular groups ahead of public interest (Admati & Hellwig, 2013). The authors believe that, if regulators and politicians were to act in a way that places public interest ahead of private interests, the financial system would be much safer than it is nowadays. However, they note that this would require "political will" (Admati & Hellwig, 2013).

⁹⁸See the following article. Eggen, D., Murakami Tse, T. Wall Street Shifting Political Contributions to Republicans (2010, February 24), *The Washington Post*. Accessed 09 April 2015. Retrieved from <http://www.washingtonpost.com/wp-dyn/content/article/2010/02/23/AR2010022305537.html>.

Chapter 8. Conclusions

This Master Thesis included a discussion of the major arguments for and against a tighter regulatory environment in banking. Moreover, a cost-benefit analysis of tighter regulatory requirements was conducted to answer the main research question, which is the following: “Do the societal and entrepreneurial costs of increased capital requirements in banking overcome the benefits?” On the one hand, tighter regulatory requirements would reduce the probability of future financial crises and all the associated costs related with them. The benefits of tighter capital requirements are measured in terms of output gains from a reduction in the probability of costly financial crises. On the other hand, tighter capital requirements would increase the funding costs for banks. A major assumption is that banks respond to an increase in their funding costs by increasing their lending spreads to their clients (King, 2010; BCBS, 2010; Chun et al., 2012). An increase in lending spreads by banks negatively affects the borrowing costs of households and firms, with negative effects on investment and consumption (BCBS, 2010). A reduction in investment and consumption leads to a fall in GDP. Based on the cost-benefit analysis conducted in Chapter 6 of this Master Thesis, it was found that, in the long run, the benefits of tighter regulatory requirements in banking outweigh the costs.

Chapter 2 of this Master Thesis discussed the role of the SBS in the current financial system and explained certain parts of the SBS that played a significant role during the financial crisis, such as securitization, sale and repurchase agreements and MMMFs. Due to their interconnectedness with traditional banks, shadow banks could pose great risks to the financial system (IMF, 2014). Apart from systemic risks stemming from the interconnectedness between the SBS and the traditional banking system, the IMF underlines additional risks arising from the SBS, which are size, maturity risk, liquidity risk, credit risk and leverage (IMF, 2014) for the Euro Area, the United States and Japan. Measuring the growth of the SBS in advanced and emerging economies, the IMF found that, in advanced economies, some parts of shadow banking grow (e.g. investment funds) and some parts shrink (e.g. securitization). In emerging markets, the growth of shadow banking is significant (IMF, 2014). A major hurdle that remains is the exact estimation of the systemic risks caused by the SBS. In the report by the IMF, data limitations do not allow for an exact evaluation of systemic risks arising from the SBS (IMF, 2014). Measuring the systemic risks arising from the SBS is crucial for the stability of the financial system. Further research should focus towards this direction.

Chapter 9. References

9.1. Books

Admati, A., Hellwig, M. (2013). *The Bankers' New Clothes*. Princeton University Press. Princeton, New Jersey.

Barth, R. J., Caprio, Jr G., Levine, R. (2006). *Rethinking Bank Regulation till Angels Govern*. Cambridge University Press. Cambridge.

Berk, B. J., DeMarzo, P. M., Harford, J. (2011). *Fundamentals of Corporate Finance*. Pearson Education Inc., Boston. 2nd Edition.

French, K., Baily, M. N., Campbell, J. Y., Cochrane, J. H., Diamond D. W., Duffie, D., Kashyap, A. K., Mishkin, F. S., Rajan, R. G., Scharfstein, D. S., Shiller, R. J., Song Shin, H., Slaughter, M. J., Stein, J. C., Stulz, R. M. (2010). *The Squam Lake Report Fixing the Financial System*. Princeton University Press. Princeton, New Jersey.

Gregory, J. (2010). *Counterparty Credit Risk – The New Challenge for Global Financial Markets*. John Wiley & Sons. Chichester, West Sussex. 1st Edition.

Mishkin, F. S. (2010). *The Economics of Money, Banking and Financial Markets*. Addison Wesley. Columbia University, New York. 9th Edition.

Ramirez, J. (2011). *Handbook of Corporate Equity Derivatives and Equity Capital Markets*. First Edition. John Wiley & Sons. Chichester, West Sussex.

Spong, K. (2000). *Banking Regulation: Its Purposes, Implementation, and Effects*. Public Affairs Department, Federal Reserve Bank of Kansas City. Kansas City, Missouri. 5th Edition. Accessed 03 April 2014. Retrieved from <http://www.kc.frb.org/publicat/bankingregulation/RegsBook2000.pdf>.

9.2. Journal articles

Brunnermeier, M., Ohemke, M. (2013). *The Maturity Rat Race*. Journal of Finance, Vol. 68 (2), pp. 483-521.

Gorton, G., & Metrick, A. (2010). *Regulating the Shadow Banking System*. Brookings Institution Press, Vol. 41 (2 (Fall)), pp. 261-312. DOI: 10.1353/eca.2010.0016.

Jensen, M. C., Meckling, W. H. (1976). *Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure*. Journal of Financial Economics, Vol. 3 (4), pp. 305–360.

Miles, D., Yang, J., Marcheggiano, G. (2012). *Optimal Bank Capital*. The Economic Journal, Vol. 123 (54), pp. 1-37.

Modigliani, F., Miller, M. H. (1958). *The Cost of Capital, Corporation Finance, and the Theory of Investment*. The American Economic Review, Vol. 48 (3), pp. 261-297.

Myers, S. C., Majluf, N. S. (1984). *Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have*. Journal of Financial Economics, Vol. 13 (2), pp. 187-222.

Myerson, R. (2014). *Rethinking the Principles of Bank Regulation: A Review of Admati and Hellwig's The Bankers' New Clothes*. Journal of Economic Literature, Vol. 52 (1), pp. 197-210. Accessed 13 August 2015. Retrieved from <http://dx.doi.org/10.1257/jel.52.1.197>.

Pozsar, Z., Tobias, A., Ashcraft, A., Boeskey, H. (2010). *Shadow Banking*. Economic Policy Review, Vol. 19 (2), pp. 1-16. Accessed 03 May 2015. Retrieved from <http://www.ny.frb.org/research/epr/2013/EPRvol19no2.pdf>.

Schwarcz D., Schwarcz, S. L. (2014). *Regulating Systemic Risk in Insurance*. The University of Chicago Law Review, Vol. 81 (4), pp. 1569-1640. Accessed 03 May 2015. Retrieved from https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/81_4/03%20Schwarcz_ART.pdf.

Schwarcz, S. L. (2012). *Regulating Shadow Banking*. The Review of Banking & Financial Law, Vol. 31 (1), pp. 619-642.

9.3. Publications / research papers / reports / online documents from non-profit organizations

Avdjiev, S., Kartasheva, A., Bogdanova, B. (2013). *CoCos: A Primer*. Bank for International Settlements Quarterly Review. September 2013, pp. 43-56. Accessed 03 May 2015. Retrieved from http://www.bis.org/publ/qtrpdf/r_qt1309f.pdf.

Bakk-Simon, K., Borgioli, S., Giron, C., Hempell, H., Maddaloni, A., Reccine, F., Rosati, S. (2012). *Shadow Banking in the Euro Area: An Overview* (Report No. 133). April 2012. Accessed 03 May 2015. Retrieved from the ECB website <http://www.ecb.europa.eu/pub/pdf/scpops/ecbocp133.pdf>.

Barrell, R., Davis, P. E., Fic, T., Holland, D., Kirby, S., Liadze, I. (2009). *Optimal Regulation of Bank Capital and Liquidity: How to Calibrate New International Standards*. Occasional Paper Series 38. The Financial Services Authority. Accessed 03 May 2015. Retrieved from <http://www.fsa.gov.uk/pubs/occpapers/op38.pdf>.

Basel Committee on Banking Supervision (2004). *International Convergence of Capital Measurement and Capital Standards: A Revised Framework*. June 2004. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bcbs107.pdf>.

Basel Committee on Banking Supervision (2009). *Enhancements to the Basel II Framework*. July 2009. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bcbs157.pdf>.

Basel Committee on Banking Supervision (2009). *Guidelines for Computing Capital for Incremental Risk in the Trading Book*. July 2009. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bcbs159.pdf>.

Basel Committee on Banking Supervision (2009). *Revisions to the Basel II Market Risk Framework*. July 2009. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bcbs158.pdf>.

Basel Committee on Banking Supervision (2009). *Strengthening the Resilience of the Banking Sector*. Consultative Document. December 2009. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bcbs164.pdf>.

Basel Committee on Banking Supervision (2010). *An Assessment of the Long-term Economic Impact of Stronger Capital and Liquidity Requirements*. August 2010. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bcbs173.pdf>.

Basel Committee on Banking Supervision, & Financial Stability Board (2010). *Assessing the Macroeconomic Impact of the Transition to Stronger Capital and Liquidity Requirements*. December 2010. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/othp12.pdf>.

Basel Committee on Banking Supervision (2011). *Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems*. December 2010 (Revised June 2011). Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from http://www.bis.org/publ/bcbs189_dec2010.pdf.

Basel Committee on Banking Supervision (2011). *Global Systemically Important Banks: Assessment Methodology and the Additional Loss Absorbency Requirement*. Rules Text, November 2011. Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bcbs207.pdf>.

Basel Committee on Banking Supervision (2013). *A Brief History of the Basel Committee*. July 2013. Bank for International Settlements, Basel, Switzerland.

Elliott, D. J. (2009). *Quantifying the Effects on Lending of Increased Capital Requirements*. The Brookings Institution. Washington DC, US. Accessed 03 May 2015. Retrieved from http://www.brookings.edu/~media/research/files/papers/2009/9/24-capital-elliott/0924_capital_elliott.pdf.

Elliott, D. J. (2010). *A Further Exploration of Bank Capital Requirements: Effects of Competition from Other Financial Sectors and Effects of Size of Bank or Borrower and of Loan Type*. The Brookings Institution. Washington DC, US. Accessed 03 May 2015. Retrieved from http://www.brookings.edu/~media/research/files/papers/2010/1/29-capital-elliott/0129_capital_requirements_elliott.pdf.

Elliott, D. J. (2013). *Higher Capital Requirements Would Come at a Price*. The Brookings Institution. Washington DC, US. Accessed 03 May 2015. Retrieved from <http://www.brookings.edu/research/papers/2013/02/20-bank-capital-requirements-elliott>.

Elliott, D. J., & Oliveira Santos, A. (2012). *Estimating the Costs of Financial Regulation*. IMF Staff Discussion Note. International Monetary Fund, Washington DC, US. Accessed 13 August 2015. Retrieved from <http://www.imf.org/external/pubs/ft/sdn/2012/sdn1211.pdf>.

Federal Deposit Insurance Corporation (1997). The LCD Debt Crisis in *An Examination of the Banking Crises of the Early 1980s and early 1990s* (pp. 191-210). Division of Research & Analysis: Vol. 1. Accessed 29 April 2015. Retrieved from https://www.fdic.gov/bank/historical/history/191_210.pdf.

Financial Stability Board (2011). *Shadow Banking: Strengthening Oversight and Regulation: Recommendations of the Financial Stability Board*. October 2011. Accessed 13 August 2015. Retrieved from http://www.financialstabilityboard.org/wp-content/uploads/r_111027a.pdf?page_moved=1.

Financial Stability Board (2012). *Global Shadow Banking Monitoring Report 2012*. November 2012. Accessed 13 August 2015. Retrieved from http://www.financialstabilityboard.org/wp-content/uploads/r_121118c.pdf.

Financial Stability Board (2013). *Global Shadow Banking Monitoring Report 2013*. November 2013. Accessed 13 August 2015. Retrieved from http://www.financialstabilityboard.org/wp-content/uploads/r_131114.pdf.

Hellwig, M. (2008). *Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis*. MPI Collective Goods Preprint, No. 2008/43. Accessed 12 August 2015. Retrieved from <http://ssrn.com/abstract=1309442>.

International Competition Network (2005). *An Increasing Role for Competition in the Regulation of Banks (June)*. Accessed 15 April 2015. Retrieved from <http://www.internationalcompetitionnetwork.org/uploads/library/doc382.pdf>.

International Competition Network (2009). *ICH Factsheet and Key Messages (April)*. Accessed 03 May 2015. Retrieved from <http://www.internationalcompetitionnetwork.org/uploads/library/doc608.pdf>.

Institute of International Finance (2010). *Interim Report on the Cumulative Impact on the Global Economy of Proposed Changes in the Banking Regulatory Framework*. Washington DC, US. Accessed 03 May 2015. Retrieved from <https://www.iif.com/publication/regulatory-report/global-financial-industry-leaders-support-constructive-dialogue-secure>.

International Monetary Fund (2010). *Systemic Risk and the Redesign of Financial Regulation*. In Global Financial Stability Report: Meeting New Challenges to Stability and Building a Safer System (pp. 63-87). Washington DC, US. April 2009. Accessed 03 May 2015. Retrieved from <http://www.imf.org/external/pubs/ft/gfsr/2010/01/pdf/text.pdf>.

International Monetary Fund (2014). *Shadow Banking around the Globe: How Large, and How Risky?* In Global Financial Stability Report: Risk Taking, Liquidity and Shadow Banking – Curbing Excess while Promoting Growth (pp. 65-104). Washington DC, US. October 2014. Accessed 17 April 2015. Retrieved from <http://www.imf.org/external/pubs/ft/gfsr/2014/02/pdf/text.pdf>.

Konczal, M., Stanley, M. (2013). *An Unfinished Mission: Making Wall Street Work for us*. Americans for Financial Reform and the Roosevelt Institute (pp. 83-99). Accessed 13 August 2015. Retrieved from http://rooseveltinstitute.org/sites/all/files/Unfinished_Mission_2013.pdf.

Noeth, B. J., Sengupta R. (2011). Is Shadow Banking Really Banking? *The Regional Economist*. pp. 8-13. Accessed at 08 April 2015. Retrieved from <https://www.stlouisfed.org/publications/regional-economist/october-2011/is-shadow-banking-really-banking>.

9.4. Working papers

Admati, A., De Marzo, P. M., Hellwig, M. F., Pfleiderer, P. (2011). *Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Expensive*. Working Paper No. 2065 (first draft August 2010). Stanford Graduate School of Business, Stanford, US. Accessed 03 May 2015. Retrieved from <http://www.gsb.stanford.edu/gsb-cmis/gsb-cmis-download-auth/311031>.

Baker, M., & Wurgler, J. (2013). *Do Strict Capital Requirements Raise the Cost of Capital? Banking Regulation and the Low Risk Anomaly*. Working Paper No. 19018. Cambridge, MA, US.

Bridges, J., Gregory, D., Nielsen M., Pezzini, S., Radia, A. Spaltro, M. (2014). *The Impact of Capital Requirements on Bank Lending*. Working Paper No. 486. Bank of England. Accessed 03 May 2015. Retrieved from <http://www.bankofengland.co.uk/research/Documents/workingpapers/2014/wp486.pdf>.

Chun, S. E., Kim, H. Ko, W. (2012). *The Impact of Strengthened Basel III Banking Regulation on Lending Spreads: Comparisons across Countries and Business Models*. Working Paper No. 2012-15. The Bank of Korea. Accessed 03 May 2015. Retrieved from <http://eng.bok.or.kr/contents/total/eng/boardView.action?menuNaviId=1941&boardBean.brdId=11606&boardBean.menuid=1941&boardBean.rnum=3>.

Diamond, D., Rajan, R. (1999). *A Theory of Bank Capital*. Working Paper No. 7431, Cambridge, MA, US.

Hellwig M. F. (2010). *Capital Regulation After the Crisis: Business as Usual?* Working Paper Series of the Max Planck Institute for Research on Collective Goods 2010_31. Max Planck Institute for Research on Collective Goods, Bonn, Germany. Accessed 03 May 2015. Retrieved from http://www.coll.mpg.de/pdf_dat/2010_31online.pdf.

King, M. R (2010). *Mapping Capital and Liquidity Requirements to Bank Lending Spreads*. Working Paper No. 324. Bank for International Settlements, Basel, Switzerland. Accessed 03 May 2015. Retrieved from <http://www.bis.org/publ/work324.pdf>.

Roger, S., & Vlček, J. (2011). *Macroeconomic Costs of Higher Bank Capital and Liquidity Requirements*. IMF Working Paper No. 11/103. International Monetary Fund, Washington DC, US.

Slovik, P., Cournéde, B. (2011). *Macroeconomic Impact of Basel III*. OECD Economics Department. Working Papers No. 844. OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/5kghwnhkkjs8-en>.

Vitek, F. (2009). *Monetary Policy Analysis and Forecasting in the World Economy: A Panel Unobserved Components Approach*. IMF Working Paper No. 12149. International Monetary Fund.

9.5. Magazine / newspaper articles

Eggen, D., Murakami Tse, T. (2010, February 24). Wall Street Shifting Political Contributions to Republicans. *The Washington Post*. Accessed 09 April 2015. Retrieved from <http://www.washingtonpost.com/wp-dyn/content/article/2010/02/23/AR2010022305537.html>.

Levine, M. (2015, February 20). Capital Rules Aren't the Only Reason Banking is Boring. *BloombergView*. Accessed 20 February 2015. Retrieved from

<http://www.bloombergvew.com/articles/2015-02-20/capital-rules-aren-t-the-only-reason-banking-is-boring>.

Pandit, V. (2010, November 10). We Must Rethink Basel, or Growth Will Suffer. *The Financial Times*. Accessed 09 April 2015. Retrieved from <http://www.ft.com/cms/s/0/6a490e8a-ed03-11df-9912-00144feab49a.html#axzz3UUpahVhS>.

AIG's Rescue: Size Matters (2008, September 18). *The Economist*. Accessed 09 April 2015. Retrieved from <http://www.economist.com/node/12274070>.

Capital: How Much is Enough? (2011, May 12). *The Economist*. Accessed 29 March 2015. Retrieved from <http://www.economist.com/node/18654640>.

Centrally Cleared Derivatives: Clear and Present Danger (2012, April 7). *The Economist*. Accessed 30 March 2015. Retrieved from <http://www.economist.com/node/21552217>.

Equity Capital Requirements: The People Versus the Bankers (2013, February 13). *The Economist*. Accessed 29 March 2015. Retrieved from <http://www.economist.com/blogs/freeexchange/2013/02/equity-capital-requirements>.

One Basel Leads to Another (2006, May 18). *The Economist*. Accessed 29 March 2015. Retrieved from <http://www.economist.com/node/6908488>.

Pay and the Financial Crisis: Questions of Equity (2008, September 25). *The Economist*. Accessed 09 April 2015. Retrieved from <http://www.economist.com/node/12304785>.

Shadow and Substance: Special Report on International Banking (2014, May 10). *The Economist*. Accessed 08 April 2015. Retrieved from http://www.economist.com/sites/default/files/20140510_international_banking.pdf.

Shadow banking: The Lure of Shadow Banking (2014, May 10). *The Economist*. Accessed 08 April 2015. Retrieved from <http://www.economist.com/news/leaders/21601826-shadow-banks-helped-cause-financial-crisis-better-regulated-they-could-help-avert-next>.

Shadow banking in China: Battling the darkness (2014, May 10). *The Economist*. Accessed 29 April 2015. Retrieved from <http://www.economist.com/news/finance-and-economics/21601872-every-time-regulators-curb-one-form-non-bank-lending-another-begins>.

9.6. Others

Ackermann, J. (2010, October). *The New Architecture of Financial Regulation: Will it Prevent Another Crisis?* Working Paper, Special Paper 194. Paper presented at FMG Deutsche Bank Conference. London, UK. Accessed 03 May 2015. Retrieved from <http://www.lse.ac.uk/fmg/workingPapers/specialPapers/PDF/SP194.pdf>.

Bankruptcy Basics Glossary. *Automatic Stay*. Accessed 03 May 2015. Retrieved from <http://www.uscourts.gov/FederalCourts/Bankruptcy/BankruptcyBasics/Glossary.aspx>.

Board of Governors of the Federal Reserve System (2013, August 16). *Federal Reserve Act*. Accessed 03 May 2015. Retrieved from <http://www.federalreserve.gov/aboutthefed/officialtitle.htm>.

Centre for Responsive Politics (n.d.). *Commercial Banks*. <http://www.opensecrets.org/>. Accessed 11 April 2015. Retrieved from <http://www.opensecrets.org/lobby/indusclient.php?id=F03&year=2012>.

Council of Mortgage Lenders (2013, August 1). *Basel II – Questions and Answers*. Accessed 03 May 2015. Retrieved from <https://www.cml.org.uk/cml/policy/issues/721>.

Economic Indicator Services (n.d.). *Franklin National Bank of New York*. <http://www.businesscycles.biz/>. Accessed 08 April 2015. Retrieved from <http://www.businesscycles.biz/docs/franklin.htm>.

European Commission (2010). *JRC Report under Article 12 of Directive 94/19/EC as Amended by Directive 2009/14/EC*. Joint Research Centre. Ispra, Italy. Accessed 03 May 2015. Retrieved from http://ec.europa.eu/internal_market/bank/docs/guarantee/jrc-rep_en.pdf.

Federal Deposit Insurance Corporation (2014, March 6). *Understanding Deposit Insurance*. Accessed 04 April 2015. Retrieved from <https://www.fdic.gov/deposit/deposits/>.

Federal Reserve Bank of New Zealand (n.d.). *Loan to Value Ratio Restrictions – FAQs*. Accessed 03 May 2015. Retrieved from http://www.rbnz.govt.nz/financial_stability/macro-prudential_policy/5393159.html.

Financial Stability Board (n.d.). *About the FSB*. <http://www.financialstabilityboard.org>. Accessed 11 April 2015. Retrieved from <http://www.financialstabilityboard.org/about/overview.htm>.

Gorton, G. (2009, May). *Slapped in the Face by the Invisible Hand: Banking and the Panic of 2007*. Prepared for the Federal Reserve Bank of Atlanta's 2009 Financial Markets Conference: Financial Innovation and Crisis. Jeskyl Island, Georgia.

Hahn, F., Hölzl, W. (2014). *Does Capital Make Bankers Complacent?* [PowerPoint Slides]. Austrian Institute of Economic Research.

Haldane, A. (2012). *The Doom Loop*. London Review of Books. Vol. 34 (4), pp. 21-22. Accessed 09 April 2015. Retrieved from <http://www.lrb.co.uk/v34/n04/andrew-haldane/the-doom-loop>.

Hellwig, M. (2012, March 12). *Note on Systemic Risk and "Macro-prudential" Concerns*, MPI Collective Goods, Bonn.

International Monetary Fund (n.d.). *The End of Bretton-Woods System (1972-81)*. Accessed 08 April 2015. Retrieved from <http://www.imf.org/external/about/histend.htm>.

Kashyap, A., Stein, J. C., Hanson, S. (2010). *An Analysis of the Impact of "Substantially Heightened" Capital Requirements on Large Financial Institutions*. Mimeo. Accessed 13 August 2015. Retrieved from http://www.people.hbs.edu/shanson/Clearinghouse-paper-final_20100521.pdf.

Kashyap, A. K., Rajan, R. G., Stein, J. C. (2008, August). *Rethinking Capital Regulation*. Paper presented at the Federal Reserve Bank of Kansas City Symposium, Jackson Hole, Wyoming, US.

Kaufman, G. *Bank Runs*. The Concise Encyclopedia of Economics. 2008. Library of Economics and Liberty. Accessed March 15 2015. Retrieved from the World Wide Web: <http://www.econlib.org/library/Enc/BankRuns.html>.

Laerkholm – Jensen, T. (2013). *The Cost of Financial Stability: How Increased Capital Requirements to Banks Impact Firm Growth*. Paper presented at the *Doctoral Meeting* organized by the Oxford University Center for Business Taxation. Saïd Business School, Oxford, UK. Accessed 14 August 2015. Retrieved from https://www.sbs.ox.ac.uk/sites/default/files/Business_Taxation/Events/conferences/doctoral_meeting/2013/laerkholm-jensen.pdf.

Rajan, R. (2013, March 27). Love the Bank, Hate the Banker. *The Project Syndicate*. Accessed 03 May 2015. Retrieved from <http://www.project-syndicate.org/commentary/the-inherent-tradeoffs-of-bank-regulation-by-raghuram-rajan>.

Schanz, J., Aikman, D., Collazos, P., Farag, M., Gregory, D., Kapadia, S. (2011, December). *The Long-term Economic Impact of Higher Capital Levels*. In Bank for International Settlements & the Bank of Korea, *Macroprudential Regulation and Policy*. BIS Papers No 60 presented at the Proceedings of a joint conference organized by the Bank for International Settlements and the Bank of Korea, Seoul, Korea (pp. 73-81). Bank for International Settlements, Basel, Switzerland. Accessed 13 August 2015. Retrieved from <http://www.bis.org/publ/bppdf/bispap60.pdf>.

US Securities and Exchange Commission (2000, March 17). *Market Maker*. Accessed 03 May 2015. Retrieved from <http://www.sec.gov/answers/mktmaker.htm>.

Wholesale Funding. QFINANCE Dictionary. Accessed 08 April 2015. Retrieved from <http://www.financepractitioner.com/dictionary/wholesale-funding>.

Appendix

Curriculum Vitae

Please find attached an English version of the corresponding Curriculum Vitae:

Education

University of Vienna, Vienna, Austria

10/2012 – 09/2015 (expected)

Master of Science (M.Sc.) in International Business Administration, specializing in Corporate Finance and International Management (Expected Grade: 2/6).

Thesis: "Do the societal and entrepreneurial costs of increased capital requirements in Banking overcome the benefits?"

Aristotle University of Thessaloniki, Thessaloniki, Greece

09/2006 – 10/2011

Diploma in Economics with focus on Business Administration ('Upper second-class honours').

University of Aveiro, Aveiro, Portugal

09/2009 – 02/2010

Erasmus Exchange Programme.

Experimental High School of the University of Macedonia, Thessaloniki, Greece

09/2003 – 06/2006

School-leaving Certificate (Grade: 17/20).

Professional Experience

zeb.rolfes.schierenbeck.associates GmbH, Vienna, Austria

03/2015 – Present

Internship in Finance & Risk

UniCredit Bank AG, Munich, Germany

06/2014 – 11/2014

Internship in Risk Analysis & Development – Markets Executive Office

Papadopoulos Accounting Office, Thessaloniki, Greece

07/2013 – 10/2013

Accountant Assistant

Metro Group AG, Thessaloniki, Greece

07/2011 – 09/2011

Traineeship in Logistics

IT and Language skills

Languages: Greek (native), English (fluent), German (fluent), Portuguese (Basic), Spanish (Intermediate).

Papazakas: The societal and entrepreneurial benefits and costs of increased capital requirements

IT Skills: Internet and Office Suites (Microsoft Office), SAP (Basic), Market Risk Analytics Platform, E-views, SPSS, Bloomberg L.P.

Other Information

- Member of the Economic Chamber of Greece.
- Participation in the high school choir, football, basketball teams, swimming and physical exercise.
- Travelling and becoming acquainted with people from different cultural backgrounds.
- Military obligation fulfilled

Vienna, 18.08.2015