



University of
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A Discussion of Basel III Capital Regulations within Norwegian Banking Industry

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Abstract

This study aims to investigate the developments in the Norwegian banking industry in the aftermath of stricter capital requirements and discuss the trends in funding costs, profitability and cost of intermediation within the regulatory framework. The method applied is of descriptive character, where the behavior of different factors is documented through secondary data and interpreted by employment of various research conducted in the field.

The investigation of costs shows that the systemically important banks did not lose their position for raising cheaper funds following the more stringent regulations. However, the data indicates that while the overall profitability in Norway was rather stable, the larger banks faced a decrease in the means of returns. Furthermore, it is observed that while the costs were diminishing, the cost of intermediation (i.e. lending spreads) entered an increasing phase, suggesting that banks put effort into boosting the earnings to build regulatory capital buffers through earnings retention. Concerning how the higher margins were reflected in the loans market, potential traces of heterogeneous lending practices and regulatory leakage were detected which bear significance for the outlook in Norway.

By this work, it is intended to contribute to the regulatory capital discussions with a broader perspective rather than just focusing on one dimension of the financial system. While the results can lay basis for further empirical research, it is not aimed to test any former research given the methodological scope.

Keywords: capital regulations, Basel III, funding costs, profitability, cost of intermediation, earnings retention, capital buffers.

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Table of Contents

Abstract	3
Acknowledgements	4
List of figures	6
List of tables	6
Abbreviations	7
Chapter 1: Introduction	9
1.1 Structure of the thesis	10
Chapter 2: Bank regulations	12
2.1 Micro and macro-prudential regulations	12
2.2 Why regulate banks?	12
2.3 Bank of International Settlements	13
2.4 Basel I Accord	14
2.5 Basel II Accord	18
2.6 Basel III Accord.....	28
Chapter 3: Financial industry in Norway	37
3.1 General characteristics.....	37
3.2 Interest rates.....	38
3.3 Bank funding channels	40
3.4 Banks' profitability	42
3.5 Challenges	43
3.6 Crises experience in Norway	44
3.7 Banking regulations in Norway	47
Chapter 4: Literature Review	52
4.2 The role of equity capital	53
4.3 How to build equity buffers?	53
4.3 Bank funding costs	55
4.4 Earnings retention and bank profitability	57
4.5 Cost of intermediation and repercussions	59
Chapter 5: Methodology	62
5.1 Examination.....	62
5.2 Data.....	64
Chapter 6: Descriptive Analysis	65
6.1 State of capital for Norwegian banks	65
6.2 How the equity buffers were built?	67
6.3 Bank funding costs	69
6.4 Banks' profitability	75
6.5 Cost of intermediation and repercussions	76
Chapter 7: Discussions	85
7.1 Funding costs	86
7.2 Earnings retention and bank profitability	89
7.3 Cost of intermediation and repercussions	91
7.4 What can the future bring?	98
Chapter 8: Concluding remarks	101
8.1 Conclusion	101
8.2 Limitations and further research.....	103
Bibliography	104

List of figures

Figure 1. Theoretical Framework. Own contribution.....	10
Figure 2. Structure of the thesis. Own contribution.....	11
Figure 3. Relationship between the minimum requirements and the buffers.....	31
Figure 4. Total banking system assets as a percentage of GDP, as of year-end 2013.....	37
Figure 5. Norwegian key policy rate and 3-month NIBOR 2001Q1-2016Q2.....	40
Figure 6. Funding structure of Norwegian banks and covered bond mortgage companies.....	41
Figure 7. Average ROE of Norwegian banks and 28 EU banks expressed as percentage.....	42
Figure 8. ROE in 2008 as percentage in various countries.....	46
Figure 9. Phase-in of Pillar 1 capital requirements in Norway as percentage of RWAs.....	49
Figure 10. Average mortgage risk weights of mortgages by IRB banks in comparison to standard model banks.....	50
Figure 11. CET1 levels of Nordic banking groups operating in Norway as of 31.12.2015.....	51
Figure 12. Common equity (CET1) ratio development of SIFIs and large IRB banks. 2008-2015.....	66
Figure 13. Decomposition of change in CET1 for large Nordic banks. December 2007 – December 2013.....	68
Figure 14. Decomposition of change in CET1 for six largest IRB banks in Norway. 2008-2015.....	69
Figure 15. Average deposit spread of Norwegian banks. Between 2009Q1-2016Q1.....	70
Figure 16. Five year senior CDS premiums for a sample of banks operating in Norway. 01.01.2010-31.05.2016.....	71
Figure 17. Norwegian banks' 5-year senior unsecured and covered bond spreads to 3m NIBOR 2007Q1-2016Q2 (bps), and regulatory Tier 1 Capital/RWA ratios 2008Q4-2015Q4.....	73
Figure 18. Cost of equity for large Norwegian banks between 2004-2016 (NOK).....	75
Figure 19. ROE of a sample of Norwegian banks 2005-2015.....	76
Figure 20. Average lending, deposit and interest spreads for banks in Norway 2008Q1-2016Q1.....	77
Figure 21. Average bank lending spreads according to the borrower sector. 2009Q1-2016Q1.....	78
Figure 22. Average lending spreads quoted in Norway and DNB's average lending spreads 2009Q1-2016Q1.....	79
Figure 23. Lending spreads of DNB according to different segments 2012Q1-2016Q1.....	80
Figure 24. Twelve-month credit growth by borrower type, 2009 January- 2016 January.....	81
Figure 25. Banks. Loans to households (NOK million). 2009Q2-2016Q1.....	82
Figure 26. Norwegian gross domestic product. Real. Percentage. 2005-2015.....	82
Figure 27. Gross lending to retail and corporate markets between 2010-2015.....	83
Figure 28. Loan growth in retail market 2005-2016.....	84
Figure 29. Loan growth in corporate market 2005-2016.....	85
Figure 30. Credit to Norwegian non-financial enterprises. Twelve-month growth.....	94

List of tables

Table 1. Detailed illustration of Tier 1 and Tier 2 capital under Basel I.....	15
Table 2. Risk-classification of assets within Basel I.....	16
Table 3. The 1988 Basel Accord Transitional and Implementing Agreements.....	17
Table 4. Risk-weights for credit risk in Basel II (standardized approach).....	20
Table 5. Transitional agreements for Basel III minimum capital requirements.....	29
Table 6. Individual bank minimum capital conservation standards.....	30
Table 7. Market shares of banks and mortgage companies in Norway at 30 June 2015. Percent.....	38
Table 8. The impact of a one percentage point increase in capital ratios on lending spreads, lending volumes and growth: Selected estimates.....	60
Table 9. Estimated capital need for Norwegian banks/banking groups as from 30 June 2016 (NOKbn).....	67
Table 10. Average mortgage loans risk weights of a sample of banks. 2012-2015.....	97
Table 11. Average corporate loans risk weight of a sample of banks. 2012-2015.....	97

Abbreviations

AFME	Association of Financial Markets in Europe
AMA	Advanced measurement approach
AT1	Additional Tier 1
BCBS	Basel Committee on Banking Supervision
BIA	Basic indicator approach
BIS	Bank of International Settlements
BPS	Basis points
CCP	Exposures to central counterparties
CCR	Counterparty credit risk
CCyB	Countercyclical buffer
CDS	Credit default swap
CET1	Common equity Tier 1
CIMA	Cayman Islands Monetary Authority
CRD	Capital requirements directives
CRR	Capital requirements regulations
CVA	Credit value adjustment
DKK	Danish kroner
ECFIN	Directorate-General for Economic and Financial Affairs
EED	Expected exposure at default
EU	European Union
FNO	Finans Norge
FRED	Federal Reserve Economic Data
FSA	Financial Services Authority
FSC	Financial Services Commission
FSI	Financial stability indicators
FX	Foreign exchange
GDP	Gross domestic product
G10	Group of Ten
G20	Group of Twenty
HQLA	High quality liquid assets
IBOR	Interbank offered rate
ICAAP	Internal capital adequacy assessment process
IFS	International Financial Statistics
IIF	Institute of International Finance
IMA	Internal models approach
IMF	International Monetary Fund
IRB	Internal ratings-based approach
KBN	Kommunalbanken
LCR	Liquidity coverage ratio
LGD	Loss-given-default
M	Effective maturity
MAG	Macroeconomic Assessments Group
MM	Modigliani Miller
NFD	Norwegian Ministry of Trade, Industry and Fisheries
NIBOR	Norwegian interbank offered rate
NOK	Norwegian kroner
NSFR	Net stable funding ratio
OBS	Off-balance sheet
OECD	Organization for Economic Cooperation and Development
OTC	Over-the-counter
PD	Probability of default

PE	Price/Earnings
RBC	Risk based capital
RCA	Regulatory capital arbitrage
ROE	Return on equity
RWA	Risk weighted assets
SBGF	Savings' Banks Guarantee Fund
SIFI	Systemically important financial institution
SIV	Structured investment vehicle
SME	Small and medium-sized enterprises
SSB	Statistisk Sentralbyrå (Statistics Norway)
USD	American dollar
VaR	Value-at-risk

Chapter 1: Introduction

The role of equity in banks' finance mix has always been a field of debate. However, the discussions focusing on equity financing and its potential outcomes has gained pace with the introduction of Basel III, as it reinforces more stringent equity capital regulations when compared to former frameworks.

The Basel III Framework reinforced by Bank of International Settlements (BIS) is applied in the EU through the CRR/CRD IV package, of which Norway is included as well. Even though the official incorporation of the regulations to Norwegian law took place in 2013, the banks in Norway accelerated their capital building process starting from 2010 as a result of Basel proposals. Whereas Norwegian banks did not fail to satisfy the gradually phased in requirements, as in every other economy there are some concerns over financial industry as the regulations tighten. Moreover, in the recent years the doubts have increased given the slowdown Norwegian economy is going through due to the drastically low oil prices and the heightened counter-cyclical buffer requirement that is to be in effect from 1 July 2016.

In light of these developments, this broad discussion-based work aims to investigate the Norwegian finance industry through banks' costs of funding, profitability, and cost of intermediation and see how the trends observed can be related to the regulatory capital while addressing the challenges. Hence, the main research question is stated as:

How did Norwegian financial industry develop following the stricter capital regulations?

While addressing this main problem, the following sub-questions are utilized:

- How did the banks build buffers?
- What patterns were observed in banks' funding costs? Did systemically important banks lose their advantage for raising cheaper funds?
- How did the profitability develop?
- How did the cost of intermediation advance? Can the changes be an outcome of funding costs, profitability and/or building buffers? How the changes in the spreads are reflected in loan market and competition?
- By what means can the trends observed in costs, returns and lending be explained in relation to the new capital regulations and building capital buffers?
- What can the future bring?

1.1 Structure of the thesis

The first three chapters are based on providing information regarding the background of the problem. **Chapter 1** of the study consists of introduction and research question, while **Chapter 2** gives a brief review of what is the main rationale for regulating banks and Bank of International Settlements, continues with how bank regulations evolved since the first Basel Framework and what were the shortcoming of former accords. This section includes definitions of decrees with a greater focus on regulatory capital as they will be often referred to in the analysis and discussions. Thereafter, **Chapter 3** aims to depict a general picture of Norwegian finance industry, how the banking regulations are applied in Norway and a small presentation of former and current challenges in the industry.

Chapter 4 consists of theories and literature review regarding the regulatory capital and its debated outcomes. The chapter starts with a concise definition of equity capital, its function and how it can be increased. Then, theories regarding the impacts of regulatory equity capital are introduced. The introduced theories explain how bank funding costs, profitability, choice of building capital (i.e. earnings retention) and cost of intermediation (i.e. lending spreads) are predicted to interact with the increased equity in the funding mix, where reflections of cost of intermediation such as loan growth for different borrowers and competition are also included in order to give further depth to the arguments. While the theoretical framework of the thesis is broader, it can be demonstrated as in Figure 1 at the most basic:

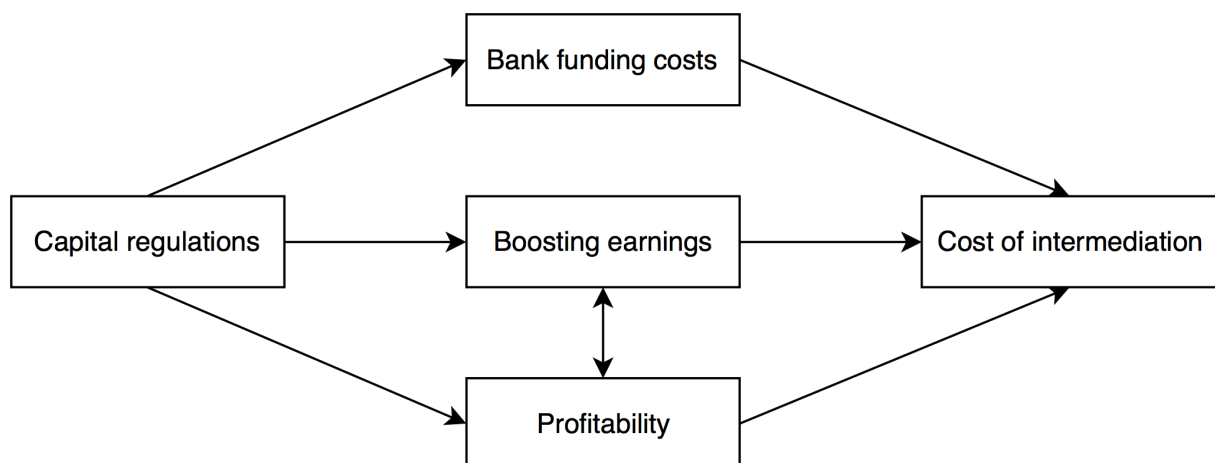


Figure 1. Theoretical Framework. Based on Chun, Kim, & Ko (2012).

Chapter 5 introduces the methodology which explains the data sources and how the problem was approached. In **Chapter 6** the analysis takes place, examining by which method the buffers were built and how funding costs, profitability and loan market developed in Norway in the

recent years following the 2007-2008 turmoil. **Chapter 7** is based upon discussions that are of descriptive character, in accordance with the analysis, pointing out how the introduced theories and the observed trends in Norway can be related while also arguing alternative causes. Subsequently, a further look into the future is provided in the light of the developments documented. Finally, **Chapter 8** presents the concluding remarks, limitations and further research.

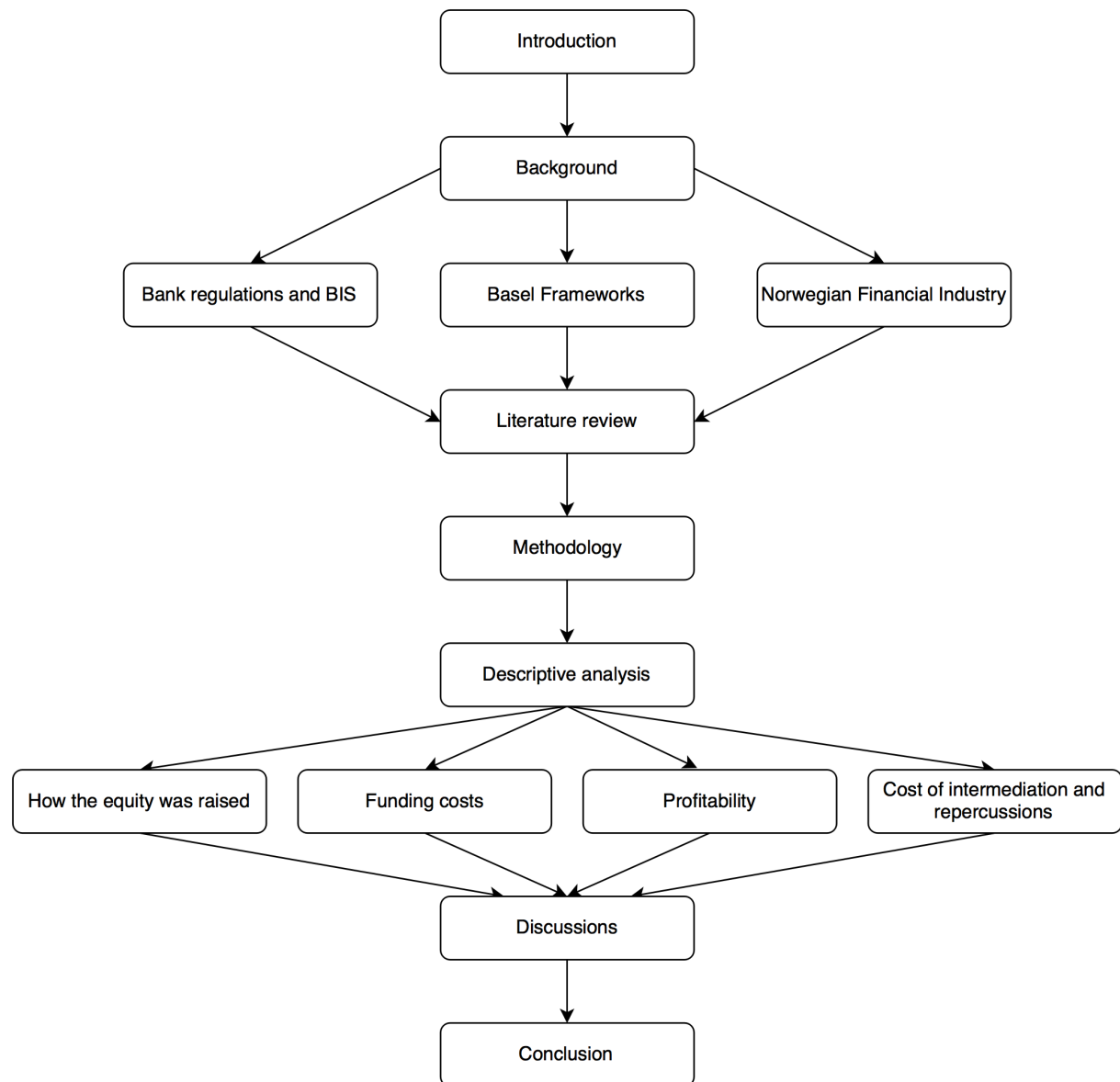


Figure 2. Structure of the thesis. Own contribution.

Chapter 2: Bank regulations

2.1. Micro and macro-prudential regulations

The rationale behind the banking regulation, and whether to regulate banks at all, has always been a hot topic in the banking literature. However, the discussions regarding bank regulations have accelerated exclusively in the last decade with respect to the lessons learned from 2007 financial turmoil, since it underscored the imperative for a sound micro-and macro-prudential framework for building up resilience against severe crises and to ensure stability of the entire financial system (Guidara, Soumaré, & Tchana 2013).

Regarding the terms micro-and macro-prudential regulations, Hanson et al. (2011) explains that micro-prudential bank regulation is based on the logic that the banks are required to restore their capital ratios in order to remain solvent, without a focus on how the ratio is restored. On the other hand, macro-prudential regulation is characterized with an effort to control the social costs associated with excessive balance-sheet shrinkage for satisfying the ratios on the part of multiple financial institutions hit with a common shock (Hanson et al., 2011).

As the regulation discussions are heated with the Basel frameworks, it is interesting that the academics did not come to a consensus on the usefulness of bank regulations. While many scholars have embraced the idea of necessity of banking regulation for financial stability, there is a small yet increasing number of economists advocating a free banking system around the world (Buckle & Beccalli, 2011).

2.2 Why regulate banks?

It is debated that the core benefit of regulating bank capital is the reduced probability of banking crisis and its associated costs on the society (Cummings & Wright, 2016). Thus, the feared consequences of bank failures through systemic risk imply that regulators are almost inevitably bound to have a prudential concern for the liquidity, solvency and riskiness of banks (Llewellyn, 1999).

Acharya et al. (2013a) defines systemic risk as “the failure of a significant part of the financial sector –one large institution or many smaller ones- leading to a reduction in credit availability that has the potential to adversely the real economy” (p.2). Thus, with respect to its scope and consequences, systemic instability represents high costs for society and is the main rationale

for regulating banks (Acharya, 2009). In accordance with these arguments emphasizing the social aspect of regulations, Llewellyn (1999) states that “regulation for systemic reasons is warranted when the social costs of failure of financial institutions (particularly banks) exceed private costs and such potential social costs are not incorporated in the decision making of the firm” (p. 13).

2.3 Bank of International Settlements

The Bank for International Settlements (BIS), which is located in Basel, was first established in 1930 and serves as the oldest financial organization in the world (Deutsches Bundesbank, 2016). For long, the main function of BIS was to handle remaining financial issues from World War I, especially arranging German reparation payments, which in time evolved into the situs for the world’s central banks and financial regulators to gather ideas and deal with international financial issues (Felsenfeld & Bilali, 2004).

The re-establishment of BIS as we know it today took place in 1974 when the central bank governors of the G10 countries enacted Committee on Banking Regulations and Supervisory Practices, which was later renamed as Basel Committee on Banking Supervision (BCBS), as a forum for regular cooperation between its member countries on banking supervisory matters, following the turmoil due to Bretton Woods breakdown (BCBS, 2015a).

BIS (2016) summarizes its main mission as:

- Fostering discussion and facilitating collaboration among central banks;
- Supporting dialogue with other authorities that are responsible for promoting financial stability;
- Carrying out research and policy analysis on issues of relevance for monetary and financial stability;
- Acting as a prime counterparty for central banks in their financial transactions;
- Serving as an agent or trustee in connection with international financial operations.

In line with this mission statement, starting from 1988 BIS has introduced Basel I, Basel II and Basel III Accords respectively in order to maintain financial stability through regulating capital and liquidity of the banks around the globe.

2.4 Basel I Accord

The onset of the Latin American debt crisis of early 1980s heightened the worries for capital ratios and attracted attention to the overriding need for a multinational accord to maintain global stability and remove sources of competitive inequality differences in national capital requirements (BCBS, 2015a). These concerns have led to the development of bank capital regulations under Basel I Accord in 1988, which was put into work in 1992 (Blundell-Wignall, Atkinson, & Roulet, 2014). Appropriately, the primary objectives for introducing the Basel I Accord were to reinforce financial stability and satisfy the need of establishing a playfield for banks from different countries (Dionne & Harchaoui, 2008).

It is of crucial significance that Basel I covers only for credit risk and barely adjusts for other types of risks (Berger et al., 2008). BCBS (1997) explains this preference by advocating that the credit risk is the major type of risk for banks, however, they stress that as a part of credit risk, country transfer risk is also incorporated to the framework. In order to count for the effects of country transfer risk, the committee defined a group of countries that were full members of OECD with special lending arrangements with IMF to be used as a basis for applying differential weighting coefficients which had crucial effects on weighting structure (BCBS, 1997). Nevertheless, in need of expanding the risk scope of the framework, amendments were made in 1998: a minimum market risk capital requirement was introduced for any open positions in debt, equity and derivatives (Buckle & Beccalli, 2011).

The key idea of Basel I was the obligation for internationally active banks to continually meet two capital adequacy ratios, Tier 1 ratio and total capital ratio, which both had risk-weighted sum of banks' on-and-off balance sheet activities as denominator (Van Roy, 2005a). In order to achieve this goal, Basel I was structured upon four principles: Constitutes of Capital, Risk Weighting, Target Standard Ratio, and Transitional and Implementing Agreements (Balin, 2010).

2.4.1 Constitutes of capital

For regulatory purposes, Basel I framework investigates bank capital under two main groups: Tier 1 Capital and Tier 2 Capital. This distinction between capital classes is created in order to guide the banks about what type of capital are counted as banks' reserves and how much of each group of reserve capital a bank can hold (Balin, 2010).

Briefly explained, Tier 1 consists of common and preferred equity shares and Tier 2 of subordinated debentures and a variety of hybrid securities (Berger et al., 2008). Therefore, they are often referred as “core capital” and “supplementary capital” respectively. The sum of these capital groups form the total capital of a bank, while the difference between them reflects the degree to which capital is explicit and permanent (Van Roy, 2005a).

Early BCBS (1997) addresses that Tier 1 capital (equity) serves as a key element within Basel I framework since it is the only element common to all countries’ banking systems and forms the basis on which the most market judgments of capital adequacy are made. BCBS (1997) further points out that “emphasis on equity capital and disclosed reserves reflects the importance the Committee attaches to securing a progressive enhancement in the quality, as well as the level, of the total capital resources maintained by major banks” (p. 4).

Table 1. *Detailed illustration of Tier 1 and Tier 2 capital under Basel I.*

Tier 1 (core capital)	Tier 2 (supplementary capital)
Common stockholders’ equity	Allowance for losses on loans and leases
Non-cumulative perpetual preferred stock	Cumulative perpetual, long-term and convertible preferred stock
Any surplus	Perpetual debt and other hybrid debt/equity instruments
Minority interest in the equity accounts of consolidated subsidiaries	Intermediate-term preferred stock and term subordinated debt
(Less) Goodwill and other intangibles	

Source: Casu, Girardone, and Molyneux (2006).

2.4.2 Risk weighting

The rationale behind risk weighting within Basel I Accord is to examine different categories of assets or OBS (off-balance sheet) exposures by relative riskiness entailed to them (BCBS, 1997). This strategy is carried out by weighting the assets in a range of 0% to 100% riskiness, in order to get risk-weighted assets (RWA) for the bank.

Basically RWA is achieved through computing the below presented formulation (Dionne & Harchaoui, 2008):

$$RWA = 0 \times (\text{category 1}) + 0.2 \times (\text{category 2}) + 0.5 \times (\text{category 3}) + 1.0 \times (\text{category 4})$$

In this framework, a higher risk weight implies a higher exposure to credit risk, therefore while category one represents riskless assets, category four is made up by high-risk; conveniently, OBS items are converted into credit risk equivalents and then assigned an appropriate risk weight (Buckle & Beccalli, 2011). A more detailed classification of assets' weighted riskiness is presented below:

Table 2. *Risk-classification of assets within Basel I.*

Risk category	Assets
Category 1 "riskless assets"	Cash held by a bank Sovereign debt held and funded in domestic currency All OECD debt Other claims on OECD central governments
Category 2 "low-risk assets"	Development bank debt Bank debt created by banks incorporated in the OECD Non-OECD bank debt with maturity of less than one year Cash items in collection Loans guaranteed by OECD public sector entities
Category 3 "moderate-risk assets"	Residential mortgages Claims on the private sector
Category 4 "high-risk assets"	Non-OECD bank debt with maturity of more than one year Claims on non-OECD dollar-denominated debt or Eurobonds Equity assets held by a bank Other assets

Source: Balin (2010).

2.4.3 Target standard ratio

Basel I Accord requires banks to satisfy two capital ratios in order to be adequately capitalized. According to these ratio obligations introduced by the accord, banks must have a Tier 1 capital that is larger than Tier 2 capital, and while Tier 1 capital is at least 4% of the RWA, total capital (Tier 1 plus Tier 2) must be at least 8% of the RWA (Berger et al., 2008; Van Roy, 2005a) as presented below:

$$\text{Tier 1 ratio} = \frac{\text{Tier 1 capital}}{\text{RWA}} \geq 0.04$$

$$\text{Total capital ratio} = \frac{\text{Tier 1 capital} + \text{Tier 2 capital}}{\text{RWA}} \geq 0.08$$

Correspondingly, Jones (2000) addresses that Basel I is aimed to boost banks' risk-based capital (RBC) through increasing the amount of regulatory capital placed in the numerators of these ratios, or decreasing the total risk appearing in the denominators as total risk-weighted assets.

2.4.4 Transitional and Implementing Agreements

This principle of Basel I handles the issue of setting the stage for the implementation of the accords by requesting each country's central bank to create functioning enforcement mechanisms (Balin, 2010). How the implementation requirements have evolved over through transitional steps time can be summarized as in Table 3:

Table 3. *The 1988 Basel Accord Transitional and Implementing Agreements.*

	End-1990	End-1992
Total capital ratio	7.25%	8%
Tier 1 ratio	3.25%	4%
Limit on general provision in Tier 2 capital	Maximum 1.5% or, exceptionally up to 2% of Tier 2 Capital	Maximum 1.5% or, exceptionally and temporarily up to 2% of Tier 2 Capital
Limit on term subordinated debt in Tier 2 capital	No limits (at discretion)	Maximum 50% of Tier 1 capital
Deduction for goodwill	Deducted from Tier 1 (at discretion)	Deducted from Tier 1 capital

Source: Van Roy (2005a).

2.4.3 Shortcomings of Basel I Accord

As the first step of the Basel Accords, Basel I attracted many skeptics considering its simplified handling of risk. Many scholars directed criticism at the committee for various levels of this simplification.

One of the most discussed aspects of the accord was the assumptions made regarding the nature of risk. Buckle and Beccalli (2011) stress that while Basel I adopted a method which perceives the risks as independent and lets them to be simply added to each other, the portfolio theory suggests that risks may be interdependent: therefore, the sum of the risks of individual securities (loans) can be lowered by diversification. With respect to this argument, Basel I was highly denounced for disregarding power of diversification.

Another source of concern regarding Basel I Accord's handling of risk was the static weighting of diverse assets. Rodriguez (2003) argues that Basel I failed to include arbitrary risk categories and arbitrary risk weights, which led to the incorrect assumption of all assets forming one category were equally risky. Furthermore, the premise that all commercial loans, even though of different quality, carry the same level of risk has opened the way for regulatory capital arbitrage (RCA), which is a crucial flaw of Basel I (Demirguc-Kunt et al., 2013).

Jones (2000) defines the problem of RCA as a result of the unprecedented opportunities for the financial institutions created by securitization and other similar financial innovations. In his extended work investigating RCA arising from pitfalls of Basel I Accord, Jones (2000) further explains that by employment of these instruments while banks substantially reduce the regulatory measures of risk, there is little or sometimes no corresponding reduction in the overall economic risks taken on by the banks, considering the inadequate and static weighting of risk for various assets within one risk category.

2.5 Basel II Accord

In 2004, The BCBS on Banking Supervision released Basel II in order to overcome the previously mentioned shortcomings of Basel I and thus foster financial stability (Drumond, 2009).

Basel II aimed to solve the issues that were experienced in the former accord by realizing improvements in the treatment of risk. Datey and Tiwari (2014) discuss that the BCBS expected to achieve this goal by the following three principles (p.897):

- Mandating that capital allocations by institutional managers are more risk sensitive.
- Separating credit risks from operational risks and quantifying both.
- Reducing the scope or possibility of regulatory arbitrage by attempting to align the real or economic risk precisely with regulatory assessment.

Pursuing these challenges, Basel II was built up on three pillars: capital requirements, supervisory review and market discipline. While risk based capital requirements remained as the main focus of the accord, Basel II innovated by covering the operational risk and allowing

some banks to use their own internal risk-measurement models for determining the capital costs (Rodriguez, 2003).

2.5.1 Pillar 1: Minimum capital requirements

The first pillar of Basel II deals with the setting of minimum capital requirements and serves as the key to many vital issues with a much more expanded understanding of risk. BCBS (2001) highlights that while both the former definition of capital and the minimum requirement of 8% of capital to RWAs remains the same, the revision focuses on calculation of the risk, i.e. the denominator of the capital ratio. Different from the former Basel accord which considered only credit risk, this time the denominator consists of credit risk, market risk and operational risk together (Sbârcea, 2014):

$$\text{Capital ratio} = \frac{\text{Total capital}}{\text{credit risk} + \text{market risk} + \text{operational risk}} \geq 0.08$$

The BCBS (2006) has determined that, similar to the previous accord, Tier 1 capital consists of paid-up share capital/common stock and disclosed reserves, while Tier 2 consists of undisclosed reserves, asset revaluation reserves, general provisions/general loan-loss reserves, hybrid capital instruments and subordinated debt. As for restrictions, the total Tier 2 (supplementary capital) elements are limited to a maximum of 100% of the total Tier 1 elements and subordinated term debt to a maximum of 50% of Tier 1 elements, whereas as a difference from Basel I, Basel II also defines a Tier 3 capital which consists of short-term subordinated debt, which is left to discretion of national authorities¹.

Credit risk

Basel II Accord investigates the credit risk by employing two different approaches: Standardized Approach and Internal Ratings-based Approach (IRB), from which the bank can choose to apply (Avramova & Le Leslé, 2012).

Standardized approach enables the risk-weighting process to get extended in order to include market-based rating agencies (Balin, 2010). So, while in the former framework there was only a simple distinction of OECD/non-OECD for setting the risk weights for the corporate,

¹ See BCBS (2006) for details.

interbank and sovereign claims, standardized approach facilitates greater sensitivity to credit risk by employing assessments of external credit agencies (Van Roy, 2005b). This approach characterizes a portfolio of bank loans by risk categories and the risk weights associated with each category are determined by an external rating institution's evaluation of counterparty risk (Jacobson, Lindé, & Roszbach, 2005).

Table 4. *Risk-weights for credit risk in Basel II (standardized approach).*

		Basel II (standardized approach)							
		AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to BB-	B+ to B-	Below B-	Not rated	
Corporate		20%	50%	100%	100%	150%	150%	100%	
Bank	Option1	20%	50%	100%	100%	100%	150%	100%	
	Option2	LT	20%	50%	50%	100%	100%	150%	50%
		ST	20%	20%	20%	50%	50%	150%	20%
Sovereign		0%	20%	50%	100%	100%	150%	100%	

Note: Option 1, rated interbank claims will receive a risk-weight one category below that assigned to claims on their sovereign of incorporation. Option 2, rated interbank claims will receive a risk-weight based on their own external rating, with short-term (i.e., less than three-month maturity) claims generally attracting lower capital charges than long-term claims.

Source: Van Roy (2005b).

The second alternative that can be applied for assessing credit risk for banks within Basel II is *Internal Rate-Based approach* (IRB). The IRB approach requires banks to specify the probability of default (PD) for each individual credit, its loss-given-default (LGD), and the expected exposure at default (EED), which demands highly-complex modelling (Blundell-Wignall & Atkinson, 2010). Considering this process requires much effort by banks' risk analysis teams, standardized approach was preferred to IRB by many banks (Van Roy, 2005b).

With respect to its in-depth nature, IRB method is divided into two sub-groups which can be applied according to the preference of banks' administration: Foundation IRB and Advanced IRB. BCBS (2006) explains that, while in the foundation methodology, banks estimate their own PD and rely on supervisory support for other risk components, in the advanced approach, banks provide more of their own PD, LGD and EED, as well as their effective maturity (M), resulting in a greater risk sensitivity than standardized approach in either case.

Balin (2010) states that IRB approaches give both regulators and bankers significant benefits:

To begin with, IRB encourages banks to take on customers of all types with lower probabilities of default by allowing these customers lower risk weightings which translate into lower reserve requirements and higher profitability for banks. Additionally, since IRB approaches allow banks to engage in self-surveillance, the costs of regulation and potential legal battle with banks decrease for the regulators (Balin, 2010).

Market Risk

Brehm and Macht (2004) address that the implementation of market risk in Basel II is comparable to the amendments made to Basel I for incorporating market risk. Nevertheless, it is of interest that Basel II makes a clear distinction between fixed income and other products such as equity, commodity and foreign exchange instruments (Balin, 2010). The measuring of market risk is carried out by applying two models suggested by the BCBS: Standardized Approach or Internal Models Approach (BCBS, 2001).

Standardized approach is to be used by the banks that do not have an internal model, and is structured upon a capital decree legislated by the central bank (Grum, 2007). This approach requires the evaluation of the exposure due to adverse movements in prices by assessing different dimensions of market risk: interest rate risk, foreign exchange risk, equity exposure risk, commodity risk and options risk (Central Bank UAE, 2009).

On the other hand, *internal models approach* (IMA) encourages bank to develop their own models for assessing stock, currency, or commodities' market risk on a case-by-case basis, which is mostly realized by value-at-risk (VaR) method (Balin, 2010). VaR can be defined as a mathematical model that expresses the maximum loss that the portfolio is likely to experience over a given holding period with a certain probability (Pelizzon & Schaefer, 2007). Accordingly, the financial institutions employing VaR under Basel II were required to report their daily value-at-risk at the 99% confidence level over a one-day horizon and over a ten-trading-days horizon, where the market-risk charge is equal to a multiple of the average ten-trading-days VaR in the last 60 days for monitoring market risk (Cuoco & Liu, 2006).

Operational risk

Basel II improves highly on the former accord by adding a new and vital risk dimension to hold regulatory capital for: operational risk (Dierick et al., 2005). Operational risk refers to the losses due to inadequate or failed internal processes, people and systems or from external events, independent from the market risk (KPMG, 2012). Basel II framework offers three different

methods for measuring the given risk: Basic Indicator Approach, Standardized Approach; and Advanced Measurement Approach (BCBS, 2006).

Under the *basic indicator approach* (BIA) only one operational risk indicator of banks' total activity is utilized; the operational risk and the corresponding capital requirement is calculated as a fixed proportion of net interest income and non-interest income, measured as the average of last three years (BCBS, 2011a; Lind, 2005). Accordingly, BIA suggest that banks should hold a capital equal to 15% of this average, where regulators are permitted to adjust this recommended amount according to their risk assessment of each bank (Balin, 2010).

Standardized approach, on the other hand, requires gross income to be measured for each business line, not for the whole institution unlike basic approach (CIMA, 2010). Business lines represented within this approach are namely corporate finance, trading and sales, retail banking, commercial banking, payment and settlement, agency services, asset management, and retail brokerage where each of them are represented with a "beta" which reflects the relative risk given to them by the BCBS's judgment (Dierick et al., 2005). Chapelle et al. (2004, p.2) explain "fraction of the gross income for capital assessment varies from 12% for the least risky business lines (i.e., retail banking, asset management) to 18% for the most risky ones (i.e. trading and settlement), with an intermediate level at 15% of the gross income for other categories (corporate banking for instance)".

The third method, *advanced measurement approach* (AMA), similar to advanced methods applied for credit and market risk, allows the bank to assess the capital requirement for operational risk by its internal methods (Lind, 2005). Balin (2010) addresses that the motivation for regulators to encourage this method is the desire to bring market discipline and self-surveillance into banking legislation. In order to comply with the standards set by the BCBS, the documented capital charge should represent the unexpected losses with one year horizon time and 99.9% confidence level where effect of insurance up to 20% can be taken into account (KPMG, 2012).

Lind (2005) clarifies that what matters even more than the amount prescribed by the capital requirement or which method to be applied is that, under Basel II, the bank management is forced to develop a system to identify, measure, manage and, not least, mitigate the operational risks of the bank, which finally leads to assessing this dimension of risk with much structured manner.

2.5.2 Pillar 2: Supervisory review process

Pillar 2 requires the supervisors to ensure that each bank has a sound internal process for determining the adequacy of its capital based on a thorough evaluation of its risks (BCBS, 2001). Therefore, this process consists of constant identifying of risks, stress-testing the bank regarding the identified risks and assessing capital adequacy for each risk by the supervisory (Maybank, 2011). A consistent application of this pillar across countries is suggested to be the solution for any undue compliance burden and for ensuring a fair playing field for banks (Dierick et al., 2005).

By this pillar, banks assess their risk profile and maintain the capital levels accordingly by utilizing Internal Capital Adequacy Assessment Process (ICAAP) (Roberts, 2008). The steps of ICAAP consists of : (1) carry out regular assessments of the amounts, types and distribution of financial resources, capital resources and internal capital that it considers adequate to cover the nature and level of the risks to which it is or might be exposed; (2) identify the major sources of risk to its ability to meet its liabilities as they fall due; (3) conduct stress and scenario tests; (4) ensure that the processes, strategies and systems used in its ICAAP, are both comprehensive and proportionate to the nature, scale and complexity of that firm's activities; and (5) document its ICAAP (FSC, 2007, p.5).

It is of dire importance that by introducing Pillar 2 which covers for that are not fully captured by Pillar 1 that focuses on banks' individual exposures to business cycle effects, regulators are allowed to create a "buffer" capital requirement in addition to the minimum requirements if the banks are captured to be "making their way around the system" or if capital reserves fall below the minimum levels to avoid any potential crises (Balin, 2010; BCBS; 2006).

2.5.3 Pillar 3: Market discipline

The final pillar of Basel II, market discipline, is developed in order to complement Pillar 1 and Pillar 2 (BCBS, 2006). This pillar focuses on improving the financial transparency of banks through mandatory disclosure of information which is needed by outside parties to form an accurate view on bank's capital adequacy (Banque de France, 2006). Appropriately, BCBS (2006) states that the disclosure must cover information regarding the scope of application, capital, risk exposures, risk assessment processes and hence the capital adequacy of the institution for satisfying Basel II accord's market discipline regulation.

Considering that different countries had different requirements regarding the quality of bank disclosure previously, by this attempt, BCBS aimed to reinforce discipline and therefore, inform the investors around the globe more efficiently (Lind, 2005).

2.5.3 Controversy of Basel II Accord

Pro-cyclicality

Pro-cyclicality of capital refers to the situation where an increase in asset prices quickly translates into stronger capital for financial institutions, which triggers additional demand for assets and further increase their prices leading to an inverted demand curve (Landau, 2009). As presented in the earlier chapters, with the introduction of Basel II Accord, the minimum capital requirements are aimed to be more sensitive to the underlying risk of the banks' operations, however this sensitivity is debated to reinforce pro-cyclicality of bank behavior (Andersen, 2011).

Blundell-Wignall and Atkinson (2010) point out that the most basic reason of pro-cyclicality is that judgments tend to underestimate risks in good times and overestimate them in bad times. In line with this argument, Drumond (2009) addresses that this phenomenon becomes more evident in an imperfect market for bank capital: in case of a recession, if bank borrowers are downgraded by the credit risk models of Basel II, minimum bank capital requirements will increase in return. Correspondingly, to the extent it is difficult for bank to raise capital, this co-movement between capital requirement and business cycle will induce banks to further reduce lending during the recession, and thus amplify the downturn (Drumond, 2009).

Gordy and Howells (2006) argue that Pillar 1 (minimum capital requirements) is the main focus in literature when pro-cyclicality is the concern, based on the estimations of the likely range of variation in regulatory capital requirements from peak to trough in a business cycle and how Pillar 1 might increase or decrease this variability. Gordy and Howells (2006) further discuss that the discretionary powers given to supervisors under Pillar 2, such as the authorization to demand additional capital buffer, can be a major reason for amplifying pro-cyclicality.

These arguments focusing on the pro-cyclical nature of Basel II have become the top of the agenda following the financial crisis of 2007, which has led the policy-makers to reinforce urgent changes in the accord (Repullo & Suarez, 2013). Consequently, the new Basel Accord

–Basel III- aimed to address this issue by launching countercyclical buffer (CCyB), which will be deeply examined under Basel III chapter.

Moral hazard

One of the main arguments of Basel II critics was the moral hazard arising from the methods of application. It was heavily debated that the increased reliance on credit rating agencies and the reliance on banks' non-transparent internal methods for assessing credit risk created morally questionable acts (Demirguc-Kunt et al., 2013).

It is argued that by granting them supervisory recognition, the credit rating agencies were given a free hand in a situation of potential conflict of interests (Cannata & Quagliariello, 2009; Moosa, 2010). The suspicion regarding credit rating agencies had two main foundations. Firstly, since they were paid by the rated parties, their independence and therefore accuracy of judgment were questionable; secondly, the capability of their statistical models were falling short especially when the products were illiquid sometimes with no market price (Cannata & Quagliariello, 2009).

On the other hand, concerning the expanded reliance on the banks' own non-transparent internal methods under Basel II, Rodriguez (2003) highlights that although banks are better positioned for assessing their own risk than the regulators, they have an incentive for underestimating the riskiness of their assets in order to lower their regulatory capital charges. Furthermore, even if some large banks do disclose their internal-based value-at-risk exercises, they are to be approached with suspicion since details are not made public and they are "black boxes" to outsiders (Gordy & Howells, 2006).

Thus, in spite of the fact that Basel II has enriched the definition of risk in order to avoid regulatory arbitrage issues, the moral hazard issues persisted (Janson, 2009). Accordingly, it is asserted that Basel II, like the previous accord, was a playground for big actors to make their way around the system.

Loans to SMEs

One of the novelties introduced with Basel II was the special treatment applied to retail credit and loans to small and medium-sized enterprises (SMEs), which was based on the fact that riskiness of such exposure derives to a greater extent from idiosyncratic risk and much less from market risk (Jacobson et al., 2005).

However, this reasoning was found problematic for the growth of the economy. It was feared that the new regulations will change the way banks analyze credits, and possibly reduce the lending activity to SMEs since they are perceived as higher risk group under Basel II (Altman & Sabato, 2005). Such a tendency created a potential threat to emerging economies where SMEs are of pivotal importance for enhancing economic growth (Lind, 2005).

2.5.4 The 2007-2008 crisis and Basel II Framework

The subprime crisis

The subprime mortgage crisis manifested itself when a steep rise in U.S. home foreclosures in 2006 spiraled out of control in 2007 which triggered a national financial crisis that became global within a year (Bianco, 2008).

The crisis had many rooted, interconnected reasons behind it. However, it is debated that first and foremost, international banks particularly in the U.S., have changed the nature of their operations from traditional model where they grant loans and hold them in their balance sheet, to a model where loans are originated and then securitized (Cannata & Quagliariello, 2009). This behavior jeopardized the financial system by the classic lending-boom bust where the growth became unsustainable due to deterioration in the quality of loans starting from 2001, loosened underwriter criteria, and decreased subprime-prime spread (Demyanyk & Van Hemert, 2011).

Crotty (2009) highlights that mortgage-backed securities were central to the boom which were very complex and nontransparent that they could not possibly be priced correctly which means they were bound to collapse once the excessive optimism of the boom faded, turning eventually into a bubble burst. Therefore, the crisis was a natural outcome of unsustainable explosions of real estate prices, mortgage debt and leveraged positions in collateralized securities (Wray, 2008).

Even though symptoms were to be observed as early as August 2007 when BNP Paribas froze three of their funds due to problems with valuing the complex assets within them, on September 15 2008, with Lehman Brothers filing for bankruptcy as a result of their exposure to subprime mortgage, market panic reached to a peak worldwide (Kingsley, 2012). The burst of the housing bubbles forced banks to write-down several hundred billion dollars in bad loans caused by

mortgage delinquencies, while stock market capitalization of major banks decreased by more than twice as much (Brunnermeier, 2008).

Basel II's role in crisis

In spite of the fact that by the time the sub-prime crisis has occurred the Basel II Accord was not in full implementation, there were many accusations directed at the framework (Buckle & Beccalli, 2011). The main blames put on the accord were; the inadequacy of capital requirements, the role of rating agencies in regulation, the pro-cyclicality of minimum capital requirements and the problems with fair-value assessments of banking assets (Cannata & Quagliariello, 2009).

Janson (2009) discusses one of the reasons that Basel II failed to deliver during the sub-prime crisis is the inadequacy of minimum capital requirements, of which banks made their ways around by regulatory arbitrage practices. After the crisis, various empirical studies have found evidence that banks have exploited Basel II's capital requirements and assigned lower risks to their denominators, in order to show their capital adequacy higher than it was particularly when they had low equity, as an example of regulatory arbitrage (Beltratti & Paladino, 2016). Although many of the banks that were rescued during the crisis were in compliance with the minimum capital requirements of Basel II, the failure of the system overall has illustrated the urgent revision of capital requirements (Demirguc-Kunt et al., 2013).

Concerning the heavily debated reliance on credit rating agencies, Basel II was also held responsible for granting these agencies regulative power which was open for moral hazard as previously highlighted. Moosa (2010) addresses the agencies have been too generous with giving AAA ratings to securities backed by subprime loans to please their paying clients who are the issuers of the securities, which became a major factor for triggering the crisis.

Furthermore, with respect to highlighted role of credit agencies and securitization process, Brunnermeier (2008) explains that even though Basel II implemented capital charges based on asset ratings, banks were able to reduce the capital charges by pooling loans in OBS vehicles. Brunnermeier (2008) further comments "because of the reduction of idiosyncratic risk through diversification, assets issued by these vehicles received a better rating than did the individual securities in the pool" (p. 6).

Last but not least, the previously addressed procyclical nature of Basel II is also believed to

have played a significant role during the sub-prime crisis. Moosa (2010) asserts that the credit squeeze, which was a product of procyclicality created by the accord, exacerbated the recession and delayed recovery in both the real economy and financial markets.

Concerning the highlighted general flaws of the accord and the inefficiency it illustrated during the financial turmoil of 2007, it was evident that changes needed to be made. Appropriately, the BCBS came up with Basel III accord.

2.6 Basel III Accord

Following the sub-prime crisis, the projections of skeptics regarding the capacity of Basel II has led to adoption of a new agreement by the BCBS, namely Basel III, in September 2010 with initial implementation in 2012 - 2019, and later postponed to 2014-2019 (Sbârcea, 2014).

With respect to the lessons learned from the sub-prime crisis the BCBS aimed to reinforce the regulations for strengthening banks' ability to absorb losses and eliminate issue of procyclicality, with a special focus on systemically important financial institutions (BCBS, 2011b). Following BSBC's framework, the structure of the new accord can be investigated in two main groups: capital regulations and liquidity regulations. The capital regulations are examined under three pillars like previous accord, while liquidity is examined individually (BCBS, 2016).

2.6.1 Pillar 1: Capital

Basel III places greater focus on the equity capital. BCBS (2011b) justifies this notion by stressing the importance of backing up banks' risk exposure by high quality capital base. The committee further discusses that the sub-prime crisis has illustrated the inconsistency in definition of capital and the lack of disclosure that could have assisted the market to fully assess the quality of capital between institutions (BCBS, 2011b). Appropriately, the Basel III framework aim to define and regulate capital more strictly when compared with Basel II.

Level and quality of capital

Considering that capital definition of Basel III is stricter and more detailed than former accords, there have been some changes in regulatory capital categories. To being with Tier 3 capital and innovative hybrid capital instruments with an incentive to redeem are to be phased out, as they did not perform well during the sub-prime crisis (EY, 2011).

Under Basel III, regulatory capital is divided into two main groups: Tier 1 capital (going-concern capital) and Tier 2 capital (gone-concern capital) (Chun et al., 2012). Tier 1, which is the main focus of the Basel III capital regulation, is defined as the sum of Common Equity Tier 1 (CET1) and Additional Tier 1 (AT1) (Avdjiev, Kartasheva, & Bogdanova, 2013). Basel III proposes that CET1 consists solely of common shares and retained earnings representing the capital of best quality, while AT1 comprises of non-CET1 instruments with strict requirements in terms of subordination and loss absorption, such as the non-cumulative perpetual preferred shares (Deloitte, 2014).

Tier 2, on the other hand, is expected to absorb losses on a “gone-concern” basis, consisting mainly of undisclosed reserves, asset revaluation reserves, general provisions/general loan-loss reserves, hybrid (debt/equity) capital instruments and subordinated debt (Marks & Nicolaides, 2014).

The new capital requirements have changed the ratios as well, with a greater focus put on equity capital. BCBS (2011b) lists the main requirements to be met as follows:

- CET1 must be at least 4.5% of RWAs at all times.
- Tier 1 Capital must be at least 6.0% of RWAs at all times.
- Total capital (Tier 1 plus Tier 2) must be at least 8.0% of RWAs at all times.

Even though the implementation process took off in January 1 2013, with lower requirements as presented below, the banks of all G20 economies were required to satisfy the minimum capital requirements as of January 1 2015 (BCBS, 2011b).

Table 5. *Transitional agreements for Basel III minimum capital requirements.*

	2013	2014	2015	2016	2017	2018	2019
CET1	3.5%	4.0%	4.5%	4.5%	4.5%	4.5%	4.5%
Tier 1	4.5%	5.5%	6.0%	6.0%	6.0%	6.0%	6.0%
Total Capital	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%

Source: Sidley LLP (2010).

It is of paramount importance that the 4.5% ratio required for CET1 is after necessary deductions are made. The deductions to be made from equity capital are goodwill, deferred tax assets, intangibles, certain holdings in other unconsolidated financial institutions, shortfall of

the stock of provisions to expected losses, defined benefit pension fund assets and investments in own shares (EY, 2011).

Capital conservation buffer

As an improvement on the former accord, Basel III introduces a capital conservation buffer of 2.5% comprising of CET1 capital only, which means that banks will need to hold a common equity ratio of 7.0% taken together with minimum equity capital requirements (Hannoun, 2010).

BCBS (2011b) explains the rationale for establishing such a buffer is to assure that banks hold buffers of capital above the regulatory minimum outside of periods of stress. Caruana (2010) points out that a unique feature of the buffer is, unlike the minimum capital, it can be drawn down as banks experience losses and therefore, contribute to lessening the pressure to restrict credit.

As the capital ratio declines and the bank uses the conservation buffer for absorbing losses, for rebuilding the buffer, the banks will either retain a higher percentage of earnings, impose restrictions on distributable items such as dividends, share buybacks and discretionary bonuses (Hannoun, 2010). Alternatively, the bank can choose to raise new capital from the private sector (BCBS, 2011b).

Concerning the issue of retaining earnings and restricting distributable items, BCBS (2011b) stresses that the constraints imposed on banks with capital levels at the top of the range would be minimal, reflecting an expectation that banks' capital levels will from time to time fall into this range. An illustration of how much of the earnings to be retained as capital conservational buffer, varying according to the CET1 levels is presented below:

Table 6. *Individual bank minimum capital conservation standards.*

Common Equity Tier 1 Ratio (CET1)	Minimum Capital Conservation Ratios (expresses as a percentage of earnings)
4.5% - 5.125%	100%
> 5.125% - 5.75%	80%
> 5.75% - 6.375%	60%
> 6.375% - 7.0%	40%
> 7.0%	0%

Source: BCBS (2011b).

Countercyclical buffer

Countercyclical buffer feature of the recent Basel Accord can basically be defined as BCBS's attempt to address the heavily criticized pro-cyclical nature of Basel II that came under the light during the subprime crisis.

It is argued that financial crises are the result of mutually reinforcing processes between the financial and real sides of the economy, where the imbalances are driven by unsustainable economic expansion manifesting itself in unusually rapid growth in credit and asset prices (Drehmann, Borio, & Tsatsaronis, 2011). Accordingly, the main rationale for establishing the countercyclical buffer is to strengthen the banks' shields against a build-up of systemic vulnerabilities which characterizes with excessive credit growth (Drehmann & Tsatsaronis, 2014). Hence, CCyB is designed to be released under recessions; while it is to be activated during good times to assure that banks build capital for next recession (Sveriges Riksbank, 2012).

For realizing this goal Basel III framework has introduced a time-varying requirement on top of the minimum requirement; countercyclical capital buffer (CCyB), which demands banks to hold a capital ratio of zero to 2.5% to RWAs consisting of CET1 quality capital for absorbing losses (Sveriges Riksbank, 2012). The approval for launching this buffer is given to national authorities, where the buffer phases in after a preannouncement period of 12 months (Marks & Nicolaides, 2014).

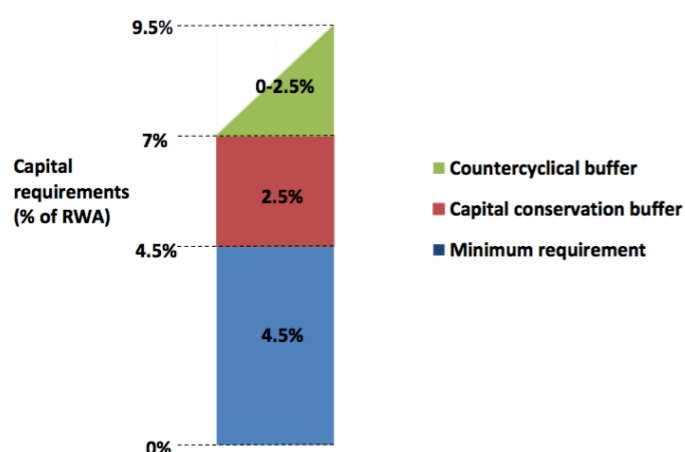


Figure 3. Relationship between the minimum requirements and the buffers. Reprinted from Sveriges Riksbank (2012).

Risk coverage

This dimension of Basel III is related to the denominator of the capital ratio, where the various risks are expressed numerically as in the previous accords.

As previously discussed, the standardized approach relying heavily on external credit ratings and advanced approach relying on internal models under Basel II framework has caused significant problems to the system. BCBS (2011b) addresses the need of expanding risk coverage both for on and off balance sheet items, especially for derivative related exposures, following the lessons learned from the sub-prime crisis. To this end, major revisions were made regarding market risk and counterparty credit risk (CCR), with a focus on securities financing transactions and over-the-counter derivatives (EY, 2011; Marks & Nicolaides, 2014). BCBS (2016) summarizes the main bullet points as trading book and securitizations, CCR, bank exposures to central counterparties (CCPs).

Regarding the *trading book and securitizations*, Hannoun (2010, p.7) summarizes the main changes as below:

- Introduction of a 12-month stressed VaR capital charge;
- Incremental risk capital charge applied to the measurement of specific risk in credit sensitive positions when using VaR;
- Similar treatment for trading and banking book securitizations;
- Higher risk weights for re-securitisations;
- Higher credit conversion factors for short-term liquidity facilities to off-balance conduits and SIVs (the shadow banking system); and
- More rigorous own credit analysis of externally rates securitization exposures with less reliance on external ratings.

As for CCR, Basel III has two central tools for addressing this risk: credit value adjustments (CVAs) and wrong-way risk. Through CVA item, banks are subjected to capital charge for potential mark-to-market losses as a result of deteriorations in creditworthiness of their counterparties; while wrong-way risk is applied by stress-testing and scenario analyses to identify risk that is positively correlated with counterparty creditworthiness (Marks & Nicolaides, 2014). Finally, concerning the CCP, it is decided that trade exposures qualifying for CCP will receive a 2% risk weight (BCBS, 2016).

Leverage Ratio

One of the innovations that has been brought by Basel III regarding capital adequacy is the leverage ratio. The rationale for introducing this tool can simply be explained by the adverse role of build-up of excessive on-and-off balance sheet leverage of the banks during the crisis (BCBS, 2011b).

Hannoun (2010) highlights that even though prior to the crisis many banks reported strong Tier 1 risk based ratios, they were still able to build up high levels of on an off balance sheet leverage; therefore, the new leverage ratio will help to assure that we do not miss the sight of the fact that there are system-wide risks that need to be underpinned by capital. Accordingly, the leverage ratio is designed as a supplementary item to risk-based measures of regulatory capital and requires banks to limit their leverage to 3%, which translates into that a bank's total assets should not be more than 33 times of bank capital (KPMG, 2011).

Since leverage ratio aims to ensure that banks have sufficient capital to sustain losses, it is similar to the traditional capital adequacy requirements, nevertheless, it differs from them by not being based on risk-weights which enables this tool to limit the extent to which banks can expand their balance sheet even for operations that are considered relatively risk-free (Wagman, 2013).

Systematically important financial institutions

The new regulations regarding systematically important financial institutions, mostly referred as the SIFIs, is one of the major changes in the Basel accord.

The establishment of exclusive regulations for SIFIs can be examined as a legacy of the sub-prime crisis, where the collapse of giants put enormous stress on the global economy. To avoid such turmoil in the future, Basel III demands SIFIs to hold more and better quality capital and meet stricter liquidity requirements when compared to other institutions, given their significant importance for the economy and systemic stability (Georg, 2011). This aim is realized by introducing "SIFI surcharge" which requires the SIFIs to hold an amount of extra capital that will range from 1% to 3.5%, with no bank in the first instance being subjected to a surcharge more than 2.5% (Salmon, 2011).

2.6.2 Pillar 2: Risk management and supervision

The Pillar 2 under Basel III is similar to the Pillar 2 of previous accord from many aspects. As the former accord, the BSBC aims to address firm-wide governance and risk management, to capture OBS exposures and securitization activities, and to create incentives for corporate governance and improvement of internal monitoring systems (BCBS, 2016). Considering Pillar 2 is related to firms' risk profile, Pillar 2 disclosure carries importance for the investors: Without Pillar 2 requirement disclosures, how much of a firm's available regulatory capital is required versus surplus can be unclear, which makes it difficult to judge a bank's capital adequacy against its risk profile, as well as its relative position to peers (Moody's Investor Services, 2014).

However, by Basel III framework improvements on the former pillar were introduced regarding the SIFIs. It is of vital importance that regulators were given the authorization for reinforcing additional buffers to systemically important banks under the new Pillar 2, depending on whether the bank is exposed to firm-specific risks that are not fully covered under the capital requirements (Zuberbühler, 2013).

2.6.3 Pillar 3: Market discipline

Pillar 3 under Basel III is based on the same principle as previous accord; ensuring good-quality information is provided to the market with respect to the risks the bank is facing.

As a revision of the former market discipline requirements, the new Pillar 3 places more importance on securitization exposures and sponsorship of OBS vehicles, while enhanced disclosures on the details of the regulatory capital components and their reconciliation to the reported accounts are required (BCBS, 2016).

2.6.4 New liquidity regulations

Basel III framework distinguishes itself from former accords also by building global liquidity requirements; Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) which are examined independently from the capital regulations.

Liquidity coverage ratio

The main objective of LCR is to promote the short-term resilience of the liquidity risk of banks by requiring them to hold an adequate stock of unencumbered high-quality liquid assets (HQLA) (BCBS, 2013a).

The LCR to be met is expressed as below:

$$LCR = \frac{\text{Stock of high quality liquid assets}}{\text{Total net cash outflows in the next 30 days}} \geq 100 \%$$

Given formulation reflects that the high-quality assets held by the banks should easily be converted into cash and meet its liquidity needs for the next 30 days under a serious liquidity stress scenario (Khan, Scheule, & Wu, 2014).

HQLA forming the numerator are to be examined in two groups: Level 1 assets and Level 2 assets. Level 1 assets should cover at least 60% of the HQLA, which is consisting of cash, central bank reserves and sovereign debt qualifying for a 0% risk weight, while Level 2 assets, which cannot be more than 40%, is mainly built up by sovereign debt qualifying for a 20% risk weight under the Basel II standardized approach for credit risk and corporate bonds and covered bonds of at least AA- rating (AFME, 2014).

With regards to the denominator, the 30-day cash outflow scenario is based upon a total expected cash outflows, minus total expected cash inflows. BCBS (2013b) explains that total expected cash outflows are calculated by multiplying the outstanding balances of various categories of liabilities and OBS commitments by the rates at which they are expected to run off or be drawn down. Respectively, the total cash inflows are calculated by multiplying the outstanding balances of various categories of contractual receivables by the rates at which they are expected to flow in, while expected cash inflows must be capped at 75% of expected cash outflows for purposes of determining net cash outflows (BCBS, 2013b; Marks & Nicolaides, 2014).

Appropriately, total net cash outflow is calculated as below (BCBS, 2013a):

Total net cash outflows over the next 30 calendar days = Total expected cash outflows – Min {total expected cash inflows; 75% of total expected cash outflows}

Net stable funding ratio

Net stable funding ratio (NSFR) is a tool introduced by BCBS for enhancing the banks' resilience. NSFR is basically the amount of available stable funding relative to the amount of required stable funding, which needs to be at least 100% on an ongoing basis (BCBS, 2014), as presented below:

$$NSFR = \frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} \geq 100\%$$

It is evident from the formulation that NSFR is developed to promote long term funding of assets in time of stress to decrease banks' dependence on volatile funding sources (Ötoker-Robe, et al., 2010).

While *available* stable funding is consisting of portion of capital and liabilities expected to be reliable over the time horizon that extends to one year, the *required* amount of stable funding is a function of the liquidity characteristics and residual maturities of the various assets held by the institutions as well as its OBS exposures (BCBS, 2014).

Based on BCBS's guidelines, King (2013) expresses the NSFR with a more detailed illustration of items and their assumed weights:

$$\frac{\text{Equity} + \text{Liabs} > 1y + (\text{StableDeposits} < 1y. 90\%) + (\text{OtherDeposits}. 80\%) + (\text{StDebt}. 50\%) + (\text{GovDebt}. 5\%) + (\text{CorpLoan} < 1y. 50\%) + (\text{Mtsgs}. 65\%) + (\text{RetLoans} < 1y. 85\%) + (\text{Other}. 100\%)}$$

Based on the formulation, it is obvious that in order to meet the requirements, banks either need to increase their available stable funding, or decrease their required stable funding. In his exhaustive work on NSFR, King (2013) explains various methods for achieving this goal: While the strategies for increasing available funding are basically to increase deposit funding, extend the maturity of wholesale funding beyond 1 year or to increase their share of Tier 1 capital (e.g. common equity), the methods for reducing the required funding can be summarized as shrinking the balance sheet, changing the composition of investments by selling illiquid assets, or changing the composition of loan book.

Chapter 3: Banking industry in Norway

3.1 General characteristics

Traditionally, banks play a dominant role in Norwegian financial system even though the banking sector is smaller than in other European countries; the total assets of the Norwegian banking sector were approximately 1.6 times the GDP at year-end 2014, which is considerably less than other comparable west European economies (FNO, 2016a).

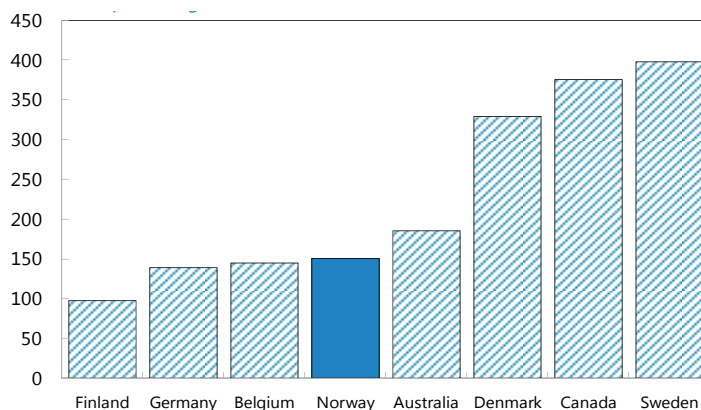


Figure 4. Total banking system assets as a percentage of GDP, as of year-end 2013. Reprinted from IMF (2015b).

According to the recent reports of IMF (2015a), the Norwegian banking sector is heavily concentrated: DNB Group ASA accounts about 35% of aggregate banking sector assets where the seven largest banks comprising 75% of assets together.

IMF (2015a) further indicates, banks, jointly with mortgage companies owned by banks, constitute 78% of total financial assets in Norway at end-2014, with particular growth in mortgage companies supported by considerable issuance of covered bonds through these entities after 2007. Correspondingly, banks and mortgage companies rely heavily on wholesale funding, in particular covered bonds, since banks' lending exceed deposits by a margin of almost two to one, with issued covered bonds becoming a leading source of financing (IMF, 2015b).

While DNB Group dominates the Norwegian banking industry as the biggest national player, the large Scandinavian financial groups also have a significant share in the financial system as presented in Table 7:

Table 7. *Market shares of banks and mortgage companies in Norway at 30 June 2015. Percent.*

	Gross lending to		Deposit from	
	Retail	Corporate	Retail	Corporate
DNB Group	30.2	31.8	31.1	37.6
Subsidiaries of foreign banks in Norway*	12.2	15.1	9.1	13.3
Branches of foreign banks in Norway**	10.8	18.8	9.4	15.1
Sparebank 1 Alliance	19.9	16.8	18.7	14.8
Eika Alliance	9.9	5.9	12.1	7.9
Other savings banks	13.1	8.5	13.8	9.3
Other commercial banks	4.0	3.1	5.8	2.1
Total	100.0	100.0	100.0	100.0
Total market (NOKbn)	2251	1264	1043	592

*Nordea Bank Norge, Santander Consumer Bank and Nordea Eiendomskreditt. **Danske Bank, Handelsbanken, Handelsbanken Eiendomskreditt, Skandiabanken, eight other branches and one mortgage lender.

Source: Norges Bank (2015a).

State ownership in the banks is an important aspect of Norwegian financial structure. As reported by NFD (2015), Ministry of Local Government and Modernization directly owns 100% of Kommunalbanken, while 34% of DNB ASA is owned by Ministry of Trade, Industry and Fisheries at year-end 2014. Considering that DNB and Kommunalbanken are two of the three systemically important financial institutions in Norway, the state's presence in the financial system is clear.

3.2 Interest rates

3.2.1 Key policy rate

The key policy rate is determined by the Norges Bank's executive board. Norges Bank (2006) explains the key policy rate as the interest rate on banks' deposits with Norges Bank (up to a certain quota), also known as the sight deposit rate, which is utilized to give policy signals to money market participants. As in the other economies in the world, the policy rate set by the central bank -Norges Bank- is a tool for stabilizing the economy both in booms and downturns (Mathai, 2012). However, the communication of policy rates by Norges Bank distinguishes itself from many other countries by providing quantitative guidance through publishing the numerical path of future policy rates that underlies the macroeconomics forecasts (Blinder et al., 2008).

The latest adjustment on key policy rate was made on March 17 2016, by lowering it 0.25 percentage point to 0.50 percent, which is still in use as of June 2016² (Sættem, 2016). The reasoning for lowering the rate by the board was expressed by the governor Øynstein Olsen as weakened growth prospects for the Norwegian economy and that inflation is expected to moderate further out (Norges Bank, 2016a).

Due to the stressed concerns about future growth and decline in inflation drivers with the oil price turmoil, it is expected that policy rate in Norway will be kept low (Bruce, Gottfries, & Lommerud, 2016). Norges Bank (2016b) highlights that as the rate approaches a lower bound, the uncertainty surrounding the effects of monetary policy increases which requires very delicate handling of the key policy rate.

3.2.2 Norwegian interbank offered rate

Norwegian interbank offered rate, or often referred as NIBOR, is the money market rate in Norway which is quoted for varying maturities. All NIBOR quotes of different maturities serve the market participants, however, 3-month NIBOR rate is particularly of importance. The spreads to 3-month NIBOR rate is often employed as a benchmark of long and medium-term bank financing costs, and hence a vital financial indicator (Raknerud et al., 2011).

NIBOR is simply calculated by averaging the rates of the panel banks for unsecured lending in Norwegian kroner for each maturity, where the panel of banks are comprised of DNB, Handelsbanken, Danske Bank, Nordea Norge, SEB and Swedbank (FNO, 2016b).

Like other IBOR rates, NIBOR can in principle be decomposed into policy rate expectations and a risk premium which expresses the extra return the banks require to lend in the unsecured interbank market rather than depositing the reserves with the central bank at the key policy rate (Tafjord, 2015).

However, it goes deeper than that as NIBOR is connected to the FX Markets. Tafjord (2015) explains that it is derived from a USD rate and the FX forward points (e.g. the forward premium) between USD and NOK, and each NIBOR panel bank bases its NIBOR quote on the USD rate it sees as best fit for reflecting the costs of borrowing USD in the unsecured interbank

² Norges Bank have announced that the rate remains at the same level of 0.50 per cent on June 23 2016.

market. Hence, it consists of two components: an interbank interest rate in USD and the price quoted in the FX swap market (Norges Bank, 2014a).

While NIBOR quotes are widely used in Norwegian financial system, the nature of this rate brings uncertainties with it. Norges Bank (2014a) highlights the uncertainty of NIBOR by pointing out the connection between the FX swap market makes NIBOR more volatile than other countries' benchmark rates: "since the volatility is imported from the forward premium, the difference between NOK/USD spot rate and forward rates, changes in NIBOR can be very difficult to understand for agents other than the NIBOR panel banks" (p. 2).

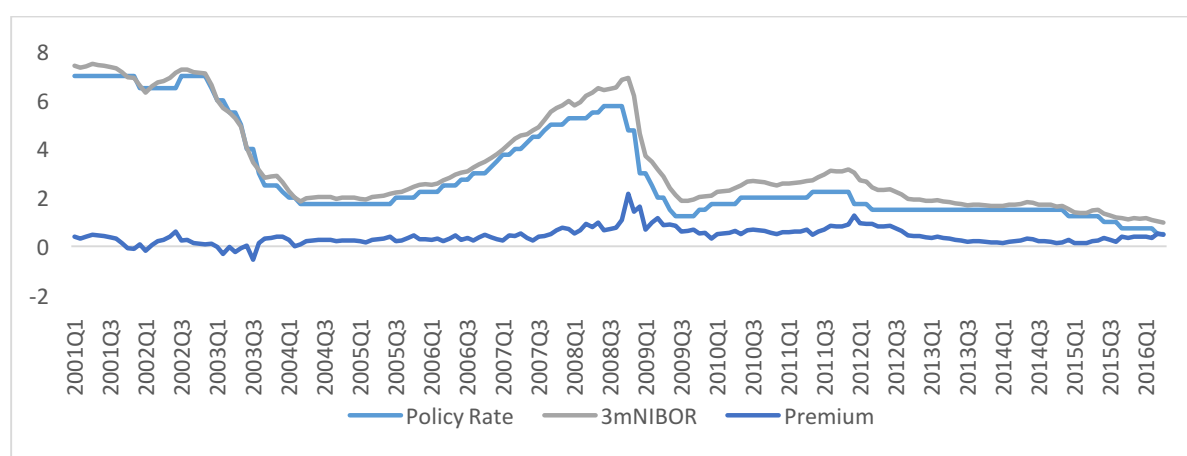


Figure 5. Norwegian key policy rate and 3-month NIBOR 2001Q1-2016Q2. Percent. Retrieved from Thomson Reuters Datastream.

Figure 5 demonstrates how the key policy rate and three-month NIBOR have developed between 2001-2016. As the numbers reveal, the two rates have been in a harmony in line with the definitions presented. The difference between the money market rate and the policy rate (premium) was widened the most during the subprime crisis (2008-2009) and European debt crisis (2010-2012), which translates into more expensive funds raising.

3.3 Bank funding channels

As mentioned briefly previously, while deposits remain as the most important source of funding, Norwegian banks also rely heavily on long-term wholesale funding through covered bonds and senior bonds for maintaining domestic lending activity (Norges Bank, 2015a), as Figure 6 indicates:

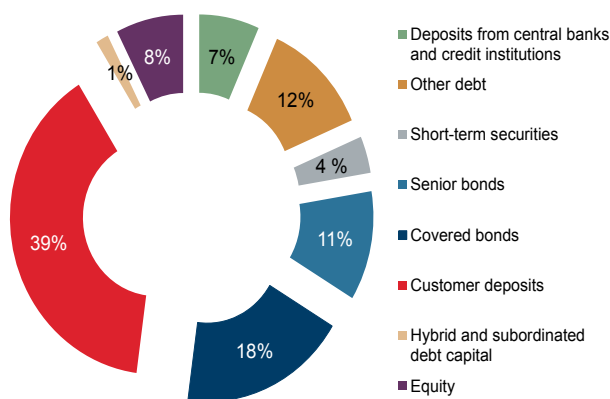


Figure 6. Funding structure of Norwegian banks and covered bond mortgage companies, percentage, as of 30 June 2015. Reprinted from Norges Bank (2015a).

Short and long-term wholesale funding is estimated to cover about half of Norwegian banks' liabilities, which reflects the banks' elevated dependence on non-deposit funding, and it is formed dominantly by foreign currencies obtained via financial markets (IMF, 2015b). Therefore, funding activities are subject for market risk due to possible turbulences in international markets (Finanstilsynet, 2015).

The significant increase in the issuance of covered bonds in the recent years is considered to be an outcome of large reserves of available residential mortgages on banks' balance sheets, high house price inflation and the increased demand for presumably low risk investments (Norges Bank, 2015a). Covered bond legislation was introduced in Norway first in 2007, and due to the relatively late introduction, the bonds did not have the same time to mature and the same deep domestic investor support when compared to other Nordic peers; in Norway only 54.0% of its EUR110bn-equivalent covered bond market was NOK dominated, where Danish covered bonds were 85.0% DKK-denominated at year-end 2014 (Danske Bank, 2014). As of end-2015, the amount of covered bonds issued in NOK was only 38.0 %, indicating increased dependence on international markets (FNO, 2016a).

In addition, banks raise short-term funding from wholesale markets in the form of foreign currency. For Norwegian banks, USD is the most preferred type of short-term funding, which exposes the banks to market risk due to very recent decline in short-term maturities that was reinforced by new regulations and expectations of US interest rates to increase (Norges Bank, 2015a).

3.4 Banks' profitability

Recent reports from Finanstilsynet³ (2015) illustrate that pre-tax profit of the banks amounted up to NOK 53 billion at year-end 2014, with an increase of 17% than the previous year. Finanstilsynet (2015) further documents that net interest income remained as the most important source of income by composing around three quarters of total operating income, which indicates that traditional lending and deposit activities keep dominating the Norwegian banks' balance sheets.

Norwegian banks have been performing well when compared to their European peers, even in the years of recent global crisis, as the numbers indicate in the following figure. Apart from the numbers presented below, fresh results from Finanstilsynet (2016a) illustrate that Norwegian banks had a return on equity (ROE) of 12.2% in the last quarter of 2015, showing that profitability still continues.

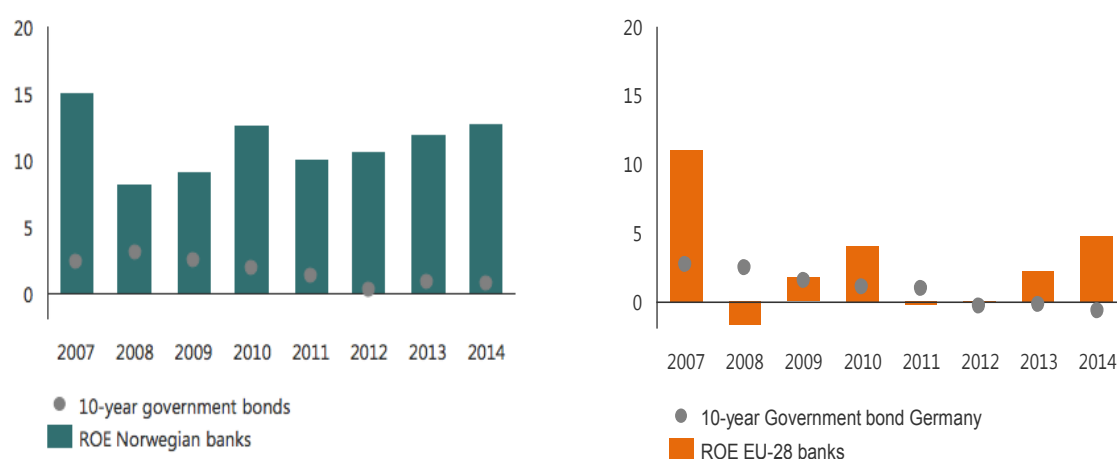


Figure 7. Average ROE of Norwegian banks and 28 EU banks expressed as percentage. Reprinted from Bjerke (2016).

Norwegian banks are considered very robust, and loan losses have been limited since the banking crises in the early 1990s, as reflected in the most recent numbers where the loan losses were only 0.17% of the outstanding loans in year-end 2015, which is almost the same as the previous year (FNO 2016a; Finanstilsynet, 2016a).

³ Norwegian FSA.

3.5 Challenges

Even though the presented numbers indicate a healthy banking industry for Norway, considering the complex nature of financial system, there are challenges to be met. Norges Bank (2015a) identifies three main vulnerabilities for Norwegian financial institutions: high household debt, persistently high real estate prices and banks' short term foreign currency funding.

To begin with, considering that Norwegian banks' balance sheets are dominated by loans to customers, the biggest risk for the industry is the credit risk (Finanstilsynet, 2015). This risk gains even more importance when the big share of mortgages granted to households is taken into consideration. Based on their comprehensive stress test, IMF (2015a; 2015b) reports that Norwegian banks' high exposure to real estate makes them vulnerable to any decline in the income since Norwegian households' debt-to-disposable income ratio is amongst the highest in the world. This situation puts Norwegian financial stability in jeopardy in case of a macroeconomic shock. Furthermore, even though Norwegian banks are reported to have low interest rate risk exposure since they both borrow and lend at floating rates, they are exposed to considerable indirect credit risk in case of a sharp increase in interest rates, given that almost all household loans are variable-rate (IMF, 2015a).

Besides, IMF (2015b) reports that the housing market in Norway is estimated to be 25-60% overpriced and given the high real estate prices together with the high household debt, banks become more relying on wholesale funding for satisfying the mortgage demand. While the house prices keep elevating, this pressure on the banks creates trouble in case of a sharp decline in the house prices which can raise the risk premiums and reduce banks' access to funding through covered bonds since it will rise the refinancing costs for covered bonds (Norges Bank, 2015a).

In addition, recent risk projections for Norway is closely related to the significant fall in the oil prices. It is expected that prolonged low oil prices will lead to higher unemployment, lower private consumption, weaker corporate lending quality, which will be followed by difficulties in obtaining competitively priced funding in the wholesale funding markets for Norwegian banks (Fitch Ratings, 2015). Correspondingly, Norges Bank (2015a) claims that even though banks have ample access to wholesale funding today, low oil prices and uncertainty surrounding Norwegian economy makes it likely that short-term USD funding will become costlier or less

accessible.

Finally, adding up to Norges Bank's concerns, Finanstilsynet (2015) claims that the increased capital requirements, in particular for SIFIs, can place more stress on the financial system. This concern is of paramount importance if the risks highlighted regarding the wholesale funding becomes the reality.

3.6 Crises experience in Norway

3.6.1 Nordic banking crisis

During early 1990s, the Nordic countries of Norway, Finland and Sweden went through a systemic-based banking crisis together, however they were all recovered relatively quickly through prompt and broad-based government intervention (Sandal, 2004).

Background of the crisis is attributed to the financial deregulation and the following bank lending boom during 1984-1987 (Vale, 2004). By ending their quantitative regulation of bank lending in the mid-80s these countries faced surge of pent-up credit demand leading to credit booms since the regulations were not prudential in aim but still formed an integral part of macro demand management (Borio, Vale, & Von Peter, 2010).

Looking at the issue from the Norwegian perspective, the crisis began in Norway in March 1988, by the announcement of Sunnmørsbanken reporting that the bank has lost more than 25% its equity due to loan losses, which was the marking event of the stressful four year-period in which 13 of the Norwegian banks representing 95% of banking assets have either failed or were seriously hurt (Ongena, Smith, & Michalsen, 2000). The Norwegian authorities stepped up in order to rescue the financial system in Norway. The Savings Banks' Guarantee Fund (SBGF) provided capital support to troubled banks by buying primary capital certificates, while Norges Bank gave liquidity loans on which it suffered losses of NOK 0.5bn as a part of resolution package (Sandal, 2004). When the major banks have failed or came close to failing in order to avoid loss of confidence in financial sector and a major credit crunch, there was no way but to inject government capital into failed banks, since Norges Bank could provide liquidity support only once solvency was ensured (Vale, 2004). During this process, the government became a major or sole owner of the banks shares, however sold them gradually after crisis was resolved in 1993 (Sandal, 2004). The toll of the crisis was heavier in other Nordics than in Norway, for example, the fiscal costs were estimated to be 3.6% of GDP in

Sweden, while it was 2.0% of GDP in Norway (Vale, 2004). When the reductions in GDP were taken as a proxy for social cost of the crisis, it was illustrated that the cost of the Nordic crisis caused an accumulated loss in GDP ranging from a low of 9.8% to a high of 27.1% (Hoggarth et al., 2002 as cited in Vale, 2004).

Nevertheless, the Nordic Banking Crisis also provided valuable lessons and experience for Norwegian economy and authorities. Sørberg (2011) asserts that Norwegian authorities became familiar with building an ample equity base during booms, ensuring the quality of equity in regulatory capital and being cautious with hybrid instruments, which became extremely handy during the financial crisis of 2007-2008.

3.6.2 The subprime crisis experience in Norway

The previously examined 2007-2008 turmoil in financial markets had global spillovers. As a natural outcome of that the crisis had its take on Norway as well.

IMF (2015a) reports that Norwegian banks were considerably less effected by the global crisis when compared to the rest of Europe; Norwegian banks maintained positive profitability during the crises and documented solid results in the low-interest rate environment ever since.

Nevertheless, the negative trend in financial markets still had impacts; Finanstilsynet (2009) reports that between 2007-2009 the value of companies on Oslo Stock Exchange more than halved, resulting in large reductions in non-financial firms' and households' wealth and hampered the life insurers and pension funds. Furthermore, the turbulence increased the risk premiums sharply, causing liquidity problems for the banks which were resolved by authorities' intervention (Finanstilsynet, 2009).

Considering the previously highlighted experience of Norwegian authorities with crisis intervention, they did not hesitate to take control in global spill over as well. Steigum and Thøgersen (2014) claim that event though global financial crisis interrupted international funding to Norwegian banks, this problem was smartly managed by authorities without facing credit crunch. Steigum and Thøgersen (2014) highlight the following issues as crucial for the success of Norwegian governmental bodies under crisis:

- The expansionary monetary and fiscal policies through cutting the policy rates,
- Norges Bank's supply of more and longer NOK funding as well as lending of USD to domestic banks, after the Lehman Brothers collapse,
- Establishment of two new funds for reinforcing Norwegian banks' Tier 1 capital as well as creation of a source of funds for industrial companies issuing bonds.

When these measures were taken together with the weakened kroner enabling increased exports, Norway could keep the recession short-lived, except for a sharp decline in non-oil private fixed investments (IMF, 2010). The banks' profitability was not just positive, but also outperformed many strong economies as illustrated in Figure 8 below:

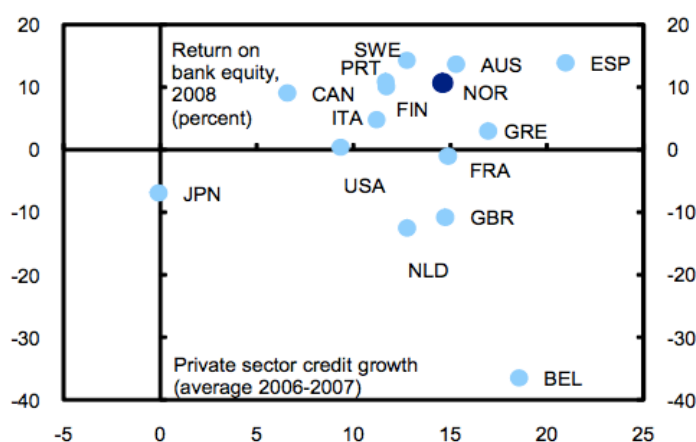


Figure 8. ROE in 2008 as percentage in various countries. Reprinted from IMF (2010).

Another important outcome of the sub-prime crisis for Norwegian banking industry was the introduction of covered bonds, which is a vital aspect of the Nordic banking industry today (Danske Bank, 2014). The covered bond practice was established under the crisis since authorities offered to swap treasury bills for covered bonds from Norwegian issuers for facilitating liquidity, which resulted in a NOK 230bn worth of covered bond exchange in swap agreements with the government during 2008 and 2009 (FNO, 2016a). As previously highlighted, starting from that period, covered bonds became an integral part of funding for Norwegian banks.

3.6.3 European debt crisis

The spillovers of the subprime crisis reached to the European economies and badly damaged the banking industry, resulting in a debt crisis which peaked during 2010-2012 (Baum, Schäfer, & Stephan, 2016). In late 2009 Greece announced her distressed debt position triggering a

sudden loss of investor confidence in the markets marking the beginning of the euro area crisis, which heightened when Greece needed to be bailed out in May 2010 (Gómez-Puig & Sosvilla-Rivero, 2016). Following the Greek bail-out the physical default probabilities of European banks rose substantially as a major contributor of systemic risk, which started to decline at end-2011 through liquidity injections by European Central Bank (Black et al., 2015). The crisis was characterized with sovereign credit rating downgrades, widened credit default swaps (CDS) spreads and pressure on stock markets, concentrating heavily in Greece, Iceland, Ireland, Portugal and Spain (Arezki, Candelon, & Sy, 2011).

During the so-called Eurozone Crisis Norway was seen as a safe haven for investors considering the lessons learnt in the Scandinavian Banking crisis and high oil prices, which led to receiving top ratings from major credit agencies (Glover, 2012). Furthermore, Norwegian banks' total direct exposure to heavily indebted euro area countries was less than 1.3% of total assets in year end-2010 (Norges Bank, 2011). However, Norwegian banks gave credit to European banks in the course of the crisis which in return elevated premiums in Norway due to the solvency risk of other banks (Austvik, 2013).

3.7 Banking regulations in Norway

Basel III requirements are implemented in EEA area through Capital Requirements Directive (CRD IV) package reinforced by European authorities. Apart from the implementation of Basel III Framework, the package gives the national authorities the possibility to establish even stricter requirements within their borders (Finanstilsynet, 2014a). Furthermore, CRD IV creates an additional buffer known as systemic risk buffer, which is applied to whole financial sector, for preventing macro-prudential risks; which ranges between 1.0% to 3.0% for all exposures (Moody's Investors Service, 2014).

3.7.1 Capital requirements

Finanstilsynet (2015) reports that the capital adequacy framework (CRR / CRD IV) was incorporated into Norwegian law in June 2013, which were put into force on 30 September 2014.

In line with Basel III Framework, the CET1 capital requirements were raised and the financial institutions were required to hold CET1, Tier 1 and own funds of 4.5%, 6.0% and 8.0%

respectively. Moreover, a capital conservation buffer of 2.5% and a systemic risk buffer of 3.0% of RWAs consisting of CET1 capital were introduced as well. In addition to these buffers, finance ministry also reinforced a countercyclical buffer of 1.0% in effect starting from 1 July 2015⁴. On the other hand, low oil prices in the recent years caused a slowdown in Norwegian economy, which is reflected in the increased regional unemployment rates and reduced consumer confidence (DNB, 2016a). Furthermore, it is observed that the pressure arising from the declined oil prices seem to build up imbalances in Norwegian economy, especially for the household sector, with the observed credit growth through mortgages and the previously stressed debt burden (Scope Ratings, 2015a). In order to address these potential vulnerabilities, Norwegian Ministry of Finance raised CCyB to 1.5% on July 1 2016, aiming to limit the credit growth in the commercial property business and therefore to dampen household debt growth (Norges Bank, 2015b).

Reflecting the regional co-operation, Swedish and Danish FSAs have announced that host country regulations will apply to their branches in Norway (OECD, 2016). However, because of different regulation implementations based on different floors, this issue is highly controversial as it will be discussed under Basel I Floor.

When it comes to the SIFIs; according to the criteria set by the Norwegian authorities, an institution is defined as a SIFI if it has total assets corresponding to at least 10% of mainland Norway's GDP or a share of the Norwegian lending market of at least 5.0% (Scope Ratings, 2015b). The SIFIs are desired to satisfy more stringent capital requirements as mentioned previously. Accordingly, they are subject to a separate buffer requirement of 1.0% from 1 July 2015 and 2.0% from 1 July 2016 as the Figure 9 illustrates.

Considering the buffers are required to consist of high quality equity capital, the minimum CET1 requirement for SIFIs increase to 13.5 % as of 1 July 2016, while the total capital requirement is 17.0% of the RWAs together with the additional Tier 1 capital and Tier 2 capital as Figure 9 presents. Furthermore, unlike the other banks and SIFIs, DNB is demanded to meet an additional buffer of 1.5% as of 1 July 2016 by Norwegian authorities under the Pillar 2 add-on regulations (DNB, 2016a). Thus, the required equity capital ratio for DNB only is 15.0 %.

⁴ See Figure 9 for details.

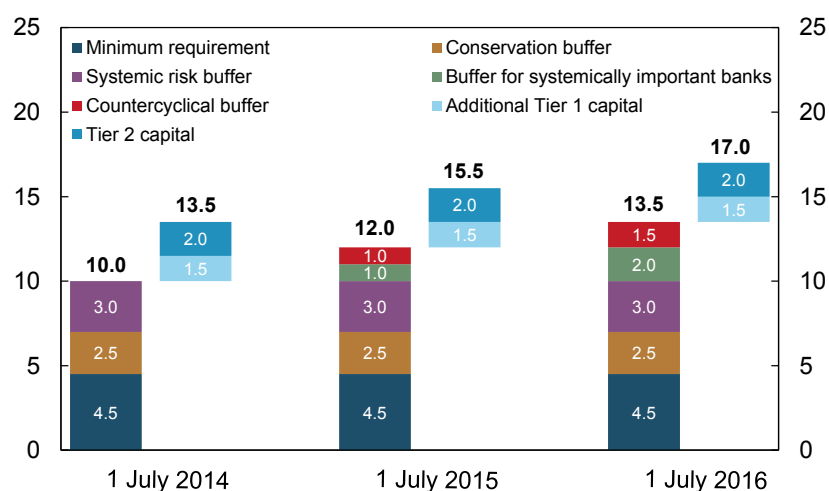


Figure 9. Phase-in of Pillar 1 capital requirements in Norway as percentage of RWAs. Reprinted from Norges Bank (2015a).

As another component of capital regulations within Basel III framework, leverage ratio has been reported by the institutions in Norway starting from third quarter of 2014 as it was required by CRD IV. While a minimum leverage ratio of 3.0% is expected to be implemented in EU area on January 1 2018, it is reported that Norwegian institutions are already well positioned for such a requirement, considering Norwegian banks' overall leverage ratio was 6.4% at end-2014 (Finanstilsynet, 2015).

3.7.2 Basel I Floor Controversy

It is of paramount importance that Norwegian authorities have chosen to calculate the RWAs different from the EU regulations, and it was decided that banks in Norway remain subject to Basel I floor. According to this adjustment the RWAs cannot be less than 80% of risk-weighted volume calculated according to Basel I, and furthermore, Basel I is the floor for calculating the RWAs, rather than the minimum capital defined in EU regulation (Scope Ratings, 2015a).

The rationale for reinforcing Basel I Floor to Norwegian banks was to avoid the problems that may arise from considerably lowered risk-weights of IRB models of Basel II Framework when compared to Basel I Framework during the transition (Borchgrevink, 2012). Particularly, the extremely low risk-weights deriving from internal models was the main concern for the introduction of Basel I Floor. It was observed that through application of Basel II, Norwegian

IRB banks⁵ were able to assign extremely low risk weights particularly to mortgages as presented by Andersen (2013):

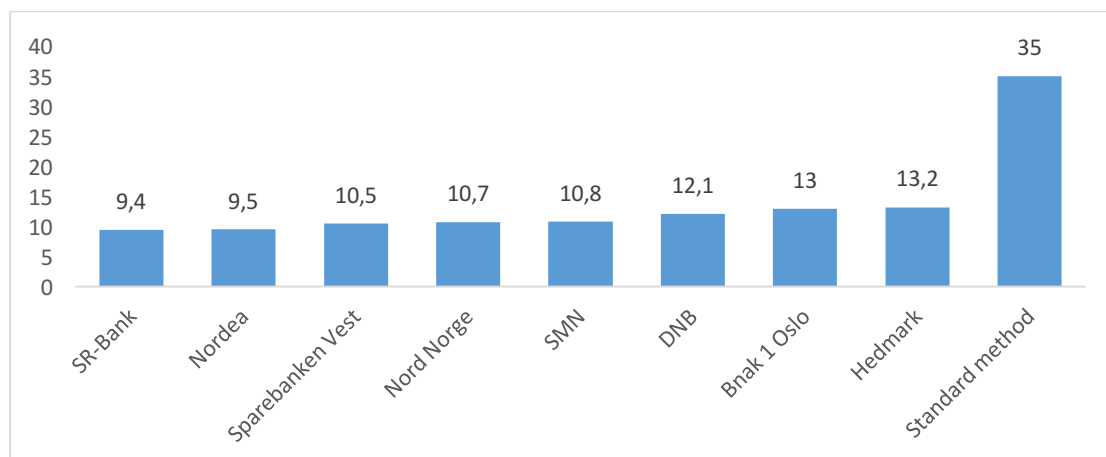


Figure 10. Average mortgage risk weights of mortgages by IRB banks in comparison to standard model banks. Percentage points. As of 2012Q4. Adapted from Andersen (2013).

However, whereas the Basel I Floor was introduced to address problems arising from exceptionally low risk weights deriving from internal models, specifically for mortgages to dampen the housing bubble, it led to further complications. First and foremost, as a result of this arrangement IRB-model banks of Norway lost competitive power against their EU-peers since the latter applies the floor to total regulative capital, while Norwegian IRB banks apply it to RWAs (Grimsby et al., 2016): The stricter floor applied on RWAs disabled Norwegian IRB banks to utilize lower risk weights deriving from the internal models, while their Nordic peers get to enjoy them, and furthermore forced the Norwegian IRB banks to build more capital for each loan granted due to higher risk weights (Grimsby et al., 2016; Skjæveland et al., 2015). As a result of this, the Norwegian IRB banks had to gather more common equity capital than the Danish and Swedish banking groups operating in Norway for satisfying the same capital ratio:

⁵IRB Model Banks of Norway: DNB Bank, Nordea Norge, Sparebank 1 SMN, Sparebank 1 SR-Bank, Sparebanken Vest, Sparebank 1 Nord Norge, Sparebanken 1 Hedmark, Sparebanken 1 Oslo og Akershus.

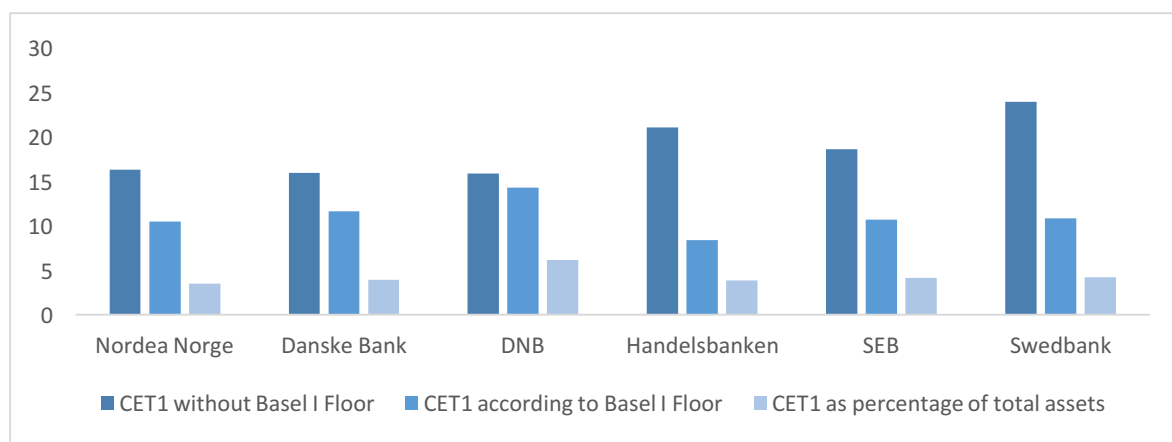


Figure 11. CET1 levels of Nordic banking groups operating in Norway as of 31.12.2015. Percentage points. Adapted from Finanstilsynet (2016a).

As Figure 11 illustrates, DNB is in an unfavorable position since they have to report the common equity capital level based on Basel I Floor, which is stricter than the other EU countries' implementation of regulation. Borchgrevink (2012) estimates that DNB gets about half a percentage point lower capital with floor on risk-weighted assets, while the floor of the total regulatory capital does not apply for DNB. Consequently, while the others presented in the graph actually have lower levels of common equity weighted against their risky assets, they get to document higher levels of capital and hence build less common equity capital to meet the same requirements. This issue raises concerns over investors' approach to Norwegian IRB banks. It is debated that if the investors are not familiar with the given unevenness in regulation, they can raise the premiums for the Norwegian IRB banks due to weaker solvency when compared to other Nordics (Grimsby et al., 2016; Skjæveland et al., 2015).

The asymmetric implementation of CRR/CRD IV regarding capital requirements is of special importance when it comes to mortgage loans given the accelerated house prices in Norway. In order to limit the mortgage loans, on January 1 2014 loss-given-default (LGD) parameter was increased from 10% to 20% both for Norwegian banks and foreign branches and on July 1 2014 additional requirements were announced only for Norwegian IRB banks, increasing their mortgage risk weights to around 20% to 25% (DNB, 2014; Skjæveland et al., 2015). This adjustment weakened Norwegian IRB banks' competitiveness against Nordic branches given that they deploy a risk weight of around 15% for mortgage loans to households (Skjæveland et al., 2015).

In addition, it is asserted that the Basel I Floor application for Norwegian IRB banks also affects their corporate loan risk weights (Grimsby et al., 2016). The higher risk attached to corporate

loans by Norwegian IRB banks is particularly important since it is reported that Handelsbanken and Danske Bank get to assign lower risk weights for corporate loan when compared to Norwegian IRB banks due to different floors they are subject to (Syversten, 2012).

3.7.2 Liquidity requirements

As presented previously, Basel III introduces two liquidity measurement tools: LCR and NSFR. Regarding the LCR, Norwegian institutions have been reporting their short-term liquidity in accordance with CRD IV since July 2014 (Finanstilsynet, 2015). Ahead of the EU schedule, as of 31 December 2015 the Norwegian SIFIs were required to meet 100% LCR requirement, while for the other banks the requirement is to be phased in by 70% as of 31 December 2015, 80% as of 31 December 2016 and 100% as of 31 December 2017 (DNB, 2016a).

As for the liquidity dimension NSFR of Basel III framework; it is yet to be applied officially. However, starting from 2011, the banks were required to report their NSFR levels in financial reports (Finanstilsynet, 2014a). It is expected a minimum level of 100% NSFR is to be implemented in Norway as soon as EU comes with a final definition of the tool (Norges Bank, 2015a).

Chapter 4: Literature Review

The priority placed on equity capital for regulating financial institutions and maintaining financial stability is unmistakable when the Basel frameworks' evolution towards higher levels of capital is studied. However, this tendency of requiring more and more regulatory capital has raised some concerns, particularly on the macro level.

Now that Basel III regulations have introduced more stringent equity regulations, finance industry protested heavily that this will lead to a rise in bank funding costs, and therefore increase the lending rates, eventually causing an economic slowdown (Junge & Kugler, 2013). Correspondingly, the issue of "costly" equity raising is a major discussion topic in finance literature, where Modigliani Miller (MM) Theory and The Pecking Order Hypothesis forge the backbone of many academic works. On the other hand, while some researchers focus on bank funding costs and widened lending spreads, other research groups investigate the issue from how these changes will apply to lending spreads based on the banks' returns and the need of retaining earnings. These two line of thoughts both emphasizing the impact of regulations on cost of bank intermediation are presented in this section.

4.2 The role of equity capital

Equity capital is the difference between total assets and total liabilities on the balance sheet, and represents the ownership interest in a firm (Gup & Kolari, 2005). It is a major funding source for the banks together with the debt instruments, however, due to the direct and indirect costs attached, it is not the first choice of the banks for raising funds (Myers & Majluf, 1984).

It is argued that following the last crisis, the importance of equity capital has become more evident. The sub-prime crisis which was characterized by excessive leverage has revealed that an obvious way to lower the systemic risk is to require banks to fund themselves with significantly more equity than before (Admati et al., 2013).

Explaining the problems with leverage funding instead of equity, Stein (2011) claims that the choices of unregulated banks with respect to funding are not socially optimal; when banks issue cheaper short-term debt, they fully capture its social benefits, however they do not fully internalize its costs. The cost is put on overall economy, and therefore on society, in a state of crisis through fire-sales (Stein, 2011). Hence, Acharya et al. (2013b) highlights that the economic rationale for imposing the regulatory capital on banks comes from the premise that banks are to internalize the costs of their risk taking through equity.

But how does equity internalize the costs and protect depositors? Admati and Hellwig (2014) explains that the main function of equity is to provide cushions for absorbing the losses without becoming insolvent, and therefore protecting the overall economy and households. In addition, it is suggested that for adequately capitalized institutions, the moral-hazard problem is virtually eliminated through minimum capital regulations since they are designed to detect and prevent excessive risk-taking (Barth et al., 2009). By ensuring the banks are well-capitalized with high quality equity capital, they are discouraged for taking risks, eventually limiting the probability of a crisis triggered by excessive risk-taking (Admati et al. 2013).

4.3 How to build equity buffers?

Basel III capital regulations require banks to hold a certain percentage of CET1 capital weighted by RWAs as explained previously. In consideration of that minimum capital requirement is presented as a ratio, mathematically it is evident that there are two main methods for increasing it: (i) increasing the nominator, namely the CET1 capital, or (ii) decreasing the denominator, which consists of assets with varying levels of risks (Jones, 2000).

4.3.1 Increasing the nominator

Since it consists of CET1 capital, the nominator of the minimum capital ratio can be increased via escalated retained earnings or by issuance of new equity (Aronsen et al., 2014). Cohen and Scatigna (2016) mention that given the size of the capital that needs to be built, banks can boost the earnings by increasing the spreads, and hence get more room for retention.

The second way of boosting the nominator is to issue new equity. It is argued that raising external equity by rights issuance has upsides when compared to retained earnings. Aronsen et al. (2014) stresses that issuing new equity leads to an immediate strengthening of the capital ratios and therefore better suited to quickly responding to authorities' or the market's requirements for higher capital, since it takes longer to increase capital through retained earnings. Nevertheless, due to the cost worries which will be examined deeper in the following sections and the negative signal given to the market which tends to lower the price of existing shares, the banks are reluctant to issue new equity (Cohen, 2013).

4.3.2 Decreasing the denominator

If the banks are in a situation where increasing the CET1 is not possible or advantageous, they can instead shrink their balance sheet items which forms the denominator of the minimum capital ratio (Aronsen et al., 2014).

King (2013) explains that banks basically can shrink their balance sheets by either reducing the size of their loan portfolio or by selling other assets, which are all ways of clearing RWAs from the balance sheet. On the other hand, the reducing of denominator can be also achieved by adjustment of RWAs. Instead of selling off assets, it is debated that banks can give more weight to less risk attached items, such as the government securities, commercial loans and mortgages (Cohen, 2013; Cohen & Scatigna, 2016; King, 2013).

While the balance sheet shrinking is not approved for its potential adverse effects on macro level (Cohen & Scatigna, 2016; Kashyap et al., 2010), it is not found feasible on the micro level as well. Fonseca and González (2006) stress that when banks apply balance sheet repairs to meet capital requirements, they may end up with overlooking positive net present value projects or selling assets at prices below their value to the bank.

4.3 Bank funding costs

4.3.1 Modigliani Miller Theorem

In their highly appraised work, Modigliani and Miller (1958) advocate that the average cost of capital of any firm is completely independent from their capital structure, namely the debt and equity mix. With respect to the increased equity requirements of Basel III, the application of this theory to banking industry has become a hot topic in finance world.

Aronsen et al. (2014) explains that the MM Theory can be explained through the basic formula presented below:

$$\text{cost of capital} = \text{cost of equity} \cdot w + \text{cost of debt} \cdot (1-w)$$

Based on the formulation it is asserted that the left hand side of the equation does not change if the weight of equity changes: if the equity ratio increases, volatility of equity reduces and so does the cost of equity while the cost of debt either remains stable or decreases since more capital is available to protect the debt holders against losses (Aronsen et al., 2014).

While the theory seems highly legit, it is criticized due to its simplified nature when it comes to banking industry. Hanson et al. (2011) clarify that the MM Theory is based on stringent conditions including symmetric information, no taxes, rational risk-based pricing, and cash flows that are independent of financial policy, and therefore does not give a depiction of the reality. Specifically, the exclusion of taxes from the framework leads to arguments that the MM Theory does not hold in reality. It is debated that the tax deductibility of interest expenses from the debt favors debt-financing over equity-financing (Aronsen et al., 2014). That being said, equity financing is perceived to be costly when the tax disadvantage of using additional equity is not completely offset by a reduction in the expected costs of financial stress (Cummings & Wright, 2016).

Tax disadvantage is not the only cost associated with equity financing. Kashyap et al. (2010) addresses that the costs attached to equity financing can be examined under stock costs and flow costs. According to Kashyap et al.'s (2010) classification, stock costs are the already mentioned tax disadvantages and other agency conflicts making the equity capital more expensive for the bank on an ongoing basis regardless of how the equity comes to the balance sheet. On the other hand, flow costs are the costs that comes with raising new external equity, namely the asymmetric information: firms do not like to issue new public equity since it can be

interpreted as a negative signal by the market and lower the stock price (Kashyap et al., 2010). Based on this notion, Gual (2012) advocates that the biggest weakness of MM Theory is that it ignores the informational asymmetries and hence, the strengthened equity capital regulations will in fact increase the cost of funding for the banks in the medium and long term.

4.3.2 Pecking Order Hypothesis

The asymmetric information issue attached to external equity raising is examined by Myers and Majluf (1984) within the well-known *Pecking Order Hypothesis*. According to this theory the sources of financing choice of firms are ranked according to their information sensitivity; (1) internal finance (entrepreneur's cash, retained earnings), (2) debt, (3) junior debt, convertibles, and (4) equity (Tirole, 2006, p. 246).

Admati et al. (2013) describes the reason why retained earnings is considered first is that it is perceived as “cheaper” since there is less information entailed to it. Therefore, it is debated that avoiding the costs attached to building equity capital buffers is possible through retained earnings (Cummings & Wright, 2016). Correspondingly, Kashyap et al. (2010) discusses that the heightened capital regulations form a basis to banking industry for behaving within the Pecking Order Hypothesis: the banks will try to gather capital by earnings retention as long as the regulations are phased in gradually.

4.3.3 Basel III capital regulations and bank funding costs

As equity regulations were strengthened in the recent years through Basel III framework, the concerns for their potential impact on banks' funding costs have escalated. Many scholars examined the bank funding costs in relation to new capital regulations and presented discussions based mainly on MM Theorem.

Whereas some studies found evidence supporting MM Theorem, some found evidence rejecting it. For example, in their empirical work Slovik and Cournède (2011) assert that an increase in bank capital will affect bank liability and equity structures and therefore the overall bank funding costs; which will be mirrored in the increased lending spreads. Their work is based on the idea that the funding costs would rise by the difference between the starting cost of capital and starting cost of debt, multiplied by the amount of new capital required; however, this method excludes the lowered risks in banking system that comes with equity financing (Slovik & Cournède, 2011; Elliott, Salloy, & Santos, 2012).

Likewise, according to IIF's (2011) approach, banks are to face increased wholesale funding costs in recognition of new capital regulations resulting in an increase in long-term wholesale borrowing costs due to reduced demand by debt investors. Based on the nature of different markets and how new regulations influence them, IIF (2011) assume a wholesale funding cost increase of a total 118bps for the United States, 100bps for Japan and 25bps for Euro area. Thus, the need to raise significant amounts of new equity and to a lesser extent bond-funding is likely to put pressure on the marginal costs of funding, which is to be passed to society by higher lending rates (IIF, 2011).

In their comprehensive work, Miles et al. (2011) estimates that even if the bank capital doubles, the average bank funding cost would only raise by 10-40bps which is to be offset by the enormous social benefits of lowered probability of systemic banking crises. They further discuss that the proportionally large bank capital increases are to be reflected as long-term small impact on the borrowing costs faced by the bank customers.

Vale (2011) applies the method presented by Miles et al. (2011) to Norwegian data, for estimating the impact of new capital regulations on funding costs and lending. According to Vale (2011), if the equity ratio is doubled the funding costs of Norwegian banks will increase in a range of 11bps to 41bps, which is to be passed on to the borrowers with a lowered loan volume of 0.33% to 1.33 %. However, Vale (2011) further argues that if the regulations are phased in properly with room for earnings retention, these effects can be milder.

On the other hand, contrary to the idea of increased costs of banks, there are also discussions that the more stringent capital regulations would in fact reduce the costs. Agur (2013) advocates that, since equity financing leads banks to internalize their risks, the wholesale financiers reduce the loan rates, which results in lower funding costs and increased charter value. Accordingly, in their empirical study Babihuga and Spaltro (2014) find evidence that regulatory capital buffers may reduce bank lending in the short run due to balance sheet repairs, however, in the long run it leads to lowered bank funding costs and potentially support bank lending growth in the future.

4.4 Earnings retention and bank profitability

Cohen and Scatigna (2016) mention that, funding costs aside, banks can widen their spreads for boosting earnings and increase the cost of intermediation to build capital through earnings

retention. Applying these arguments as a scenario analysis, Roger and Vlček (2011) find evidence that building capital by solely earnings boost is predicted to increase the lending margins by 120bps in Europe and 130bps in the US, which is to have an adverse impact on consumption and investments. While boosting the earnings in order to build buffers is crucial for this study, it is of importance that these arguments are mostly investigated with a link to ROE, given earnings retentions' association with returns.

In recognition of the strengthened capital regulations, the complex relationship between return on equity (ROE) and increased equity requirements has become the main focus of various studies. While some studies investigate the potential impacts of increased equity capital on ROE, another series of studies investigate the compound link between retaining earnings for building capital, decreasing ROE and cost of bank intermediation.

Ackermann (2010) argues that the increased requirements for Tier 1 capital would put pressure on ROE through retained earnings, and therefore, make investing in the banking sector unattractive when compared to other sectors considering the reduced returns. Correspondingly, King (2010) studies the capital regulations with a link to maintaining ROE and explains that while the cost of funding may be reduced since wholesale funding is replaced by equity funding which lowers the wholesale debts' interest rates due to less demand from the banks, the ROE is reduced as well with the lowered risk. Therefore, according to King's (2010) discussions, banks widen their lending spreads around 15bps for a representative bank in order to elevate the ROE levels since it is a vital measure of banks' performance for the investors.

Following the aforementioned discussions of King (2010), Chun et al. (2012) maps the development of lending spreads to achieve a certain level of ROE while building capital to meet the requirements. According to their estimations, the required lending spread increase varies from 0.1bps for mortgage banks to 9.1bps for commercial banks in order to maintain ROE. Likewise, in their scenario-based study Angelini and Gerali (2012) illustrate that the increase in the denominator of ROE triggered by higher capital requirements is offset by the increase in interest rate margins (i.e. lending spread increasing while deposit rates are stable or lowered).

On the other hand, there are also arguments based on how the ROE will be affected by the capital regulations with or without the pressure of retaining earnings. In line with MM Theory, the main concern regarding ROE is that it will decrease since the equity financing due to

regulation will reduce the risk attached to equity (Allen et al., 2012). Supporting these worries, Härle et al. (2010) find empirical evidence that when fully implemented, Basel III will lead to reducing ROE about four percentage points in Europe and about three percentage points in the United States.

Investigating the issue with a size-based concern, Elliott et al. (2012) points out that the large banks would be the losers of new capital regulations in the means of ROE with regards to the limitations placed on innovative products (e.g. derivatives). Likewise, based on their data set comprising of thirteen large investment banks, Bohme et al. (2011) from McKinsey illustrate that on average the ROE will go down from 20% to approximately 7% for large banks due to new regulations on OTC derivatives and market risk. While these developments raise concerns on the bankers' side, Admati et al. (2013) argues that reduced ROE during good times is not necessarily an evil feature of capital requirements since the same regulations will result in a rise in ROE during bad times through reducing shareholder risk.

4.5 Cost of intermediation and repercussions

As the different studies presented above highlights, increased lending spreads are a major concern as an outcome of increased costs, boosting earnings, and/or maintaining ROE.

The reason that the lending spreads are so crucial lies within its relationship to economic growth and hence, GDP. It is argued that more expensive lending as a result of regulations dampens economic growth which is mirrored in decreasing GDP estimations (Cohen & Scatigna, 2016). Various studies commenting on this adverse relationship between capital ratios, lending spreads and GDP growth are summarized below:

Table 8. *The impact of a one percentage point increase in capital ratios on lending spreads, lending volumes and growth: Selected estimates.*

	Lending Spread	Lending volume	GDP
MAG (2010)	+15-17 basis points	-1 to 2%	-4 basis points over 4 years
BCBS (2010)	+13 basis points	Not estimated	-9 basis points permanent
IIF (2011)	+30-80 basis points	-0.8% to 1%	-6 to 12 basis points over 5-10 years
Slovik and Cournède (2011)	+8-20 basis points	Not estimated	-4 basis points over 9 years
Elliott et al. (2012)	+5-15 basis points	Not estimated	Not estimated
Miles et al. (2011)	+5.5 basis points	Not estimated	-4.5 basis points permanent
Oxford economics (2013)	+15 basis points	Not estimated	-1.6 basis points over 9 years

Source: Cohen and Scatigna (2016, p.2).

However, it is of paramount importance that these elevated spreads are discussed to be reflected heterogeneously through the segments. Allen et al. (2012) asserts that some bank customers which are placed at the riskiest end of the credit spectrum are likely to face more expensive lending or even to be denied access to credit altogether. According to Allen et al. (2012), whereas this attitude towards risky groups may partially be a legacy of the 2007 turmoil, it is also a direct product of risk weighting system of the Basel capital regulations. Since the larger risk weights attached to “riskier” groups require more equity capital per loan for satisfying the capital ratio, it is argued that banks will concentrate their business on more secure lending through cheaper loans, such as the mortgages, while riskier groups including personal loans and corporate loans, will face lending barriers (Allen et al., 2012; Isachsen, 2016).

Examining this matter empirically, Bridges et al. (2014) estimates that loan growth following Basel III regulations is hampered most for commercial real estate and other corporate loans, while the secured household lending (i.e. mortgages) came in last. Similarly, Noss and Toffano (2014) demonstrates that an increase in the aggregate bank capital requirement during an economic upswing (such as the countercyclical buffer) is associated with a reduction in lending where the effect is larger for the corporates than to households.

The SMEs' position within the decreasing corporate loan growth is of special importance given their importance for healthy economic growth (Lind, 2005). As provided previously in Basel II's shortcomings, the loans to SMEs have weakened under risk-weight applications of Basel frameworks. Correspondingly, a recent study from BCBS (2015b) reveals that the risk weights on SMEs are, on average, more than double the average of other corporates within the IRB risk weights of internationally active banks, indicating that the difficulties of SMEs seem to persist since the previous framework.

All in all, while the academic discussions generate various results regarding the regulations, funding costs, ROE and lending, many scholars agree upon the overall benefits of capital regulations. In line with Miles et al.'s (2011) emphasis on the benefits of regulations exceeding the costs of it, Berger et al. (1995), Angelini et al. (2011), Junge and Kugler (2013) and Yan et al. (2012) discuss that even though there are minor costs attached, capital regulations' long-term benefits for reducing output volatility and therefore preventing crises, offsets the economic side effects that comes with it.

4.5.1 Competition

The long-term benefits attached to equity-financing exceeding its costs discussion seems to dominate the literature regarding regulatory capital. Then, why do banking industry oppose the regulations heavily? Seeking an answer, Kashyap et al. (2010) points out the unique nature of competition in banking industry. Kashyap et al. (2010) explains that unlike in many other industries, the only competitive advantage of banks is the ability to fund themselves cheaply considering the almost identical financial services provided; therefore, the minor effects on loan rates which are not found adverse for overall economy by previously presented studies mean a lot for the competitiveness of banks.

The issue of competition is of special importance when it comes to SIFIs, considering they are subject to even more stringent capital regulations. The regulations that require systemically important banks to raise more equity capital when compared to smaller banks is resulting in discussions of imperfect competition. Regarding this matter, Drumond and Jorge (2013) stress that according to the conventional economic theory on pricing under imperfect competition, the prices are set as a markup over marginal cost. Based on this notion, Drumond and Jorge (2013) illustrate that under Basel III, banks with market power internalize an additional cost, in terms of regulatory capital, associated with the increase of borrowers' risk default: consequently, the

intermediation margin on bank loans increases, leading to more expensive lending by the large banks.

Moreover, equity capital buffers do not create competitive imbalances only between domestic SIFIs and smaller banks. Concerning that the amount and timing of CCyB of Basel III is determined by national authorities of each country, it is addressed that this requirement of the capital regulations may lead to distortions in international competition between banks (Ackermann, 2010). The asymmetries in the application of capital regulations carry vital importance since it may induce a “leakage” where entities domestically not regulated can step up with new lending (Bridges et al., 2014), which reinforces imperfect competition and hence hurt the domestic banks.

Chapter 5: Methodology

The aim of the given study is to investigate if the reinforced equity capital regulations’ highlighted impacts on costs, profitability, loan market and competition in the literature are observed in the Norwegian banking industry. Considering that this is not an empirical work, the goal is not to draw any causality or disprove any theory mentioned, but to discuss the results in relation to the presented regulatory frameworks and theories. Hence, the analysis is of descriptive character.

5.1 Examination

Most of the analyses were based upon the data regarding six largest banks⁶ of Norway as they cover 67% of total banking assets in Norway (IMF, 2015a; Winje & Turtveit, 2014). Using these six banks also enables one to study the differences between SIFIs and non-SIFIs since they consist of two systemically important banks and four medium-sized banks operating in Norway. This issue was of importance regarding the more stringent regulations the SIFIs are subject to. On the other hand, with respect to the presented controversy regarding the transitional Basel I Floor applied in Norway on IRB banks, comparisons were made between the domestic banks and foreign branches operating in Norway where applicable.

⁶ DNB, Nordea Norge, Sparebank 1 SR Banken, Sparebank 1 SMN, Sparebanken Vest, Sparebank 1 Nord Norge.

In order to give a descriptive picture of how cost of funds, profitability, lending spreads, loan market and competition developed in the recent years, these fields were investigated by employing basic gauges. These benchmark items consisted heavily of basic spreads and ratios that are widely applied within the financial industry.

5.1.1 Funding costs

The funding costs were investigated in three sections: cost of deposits, cost of wholesale funding and cost of equity. While the results presented are discussed within MM Theory as a reference point, this practical work does not attempt to prove/disprove the theories presented formerly considering that the link between equity financing and bank funding costs is a debate field for decades now.

The cost of deposits was investigated by employing the deposit spreads to three-month money market rate, since employing this measure makes it possible to observe how much interest the banks are paying on the deposits in comparison to market conditions and interbank rates (Berkelmans & Duong, 2014). On the other hand, for studying how the wholesale funding costs have developed in the recent years, two different measures were used: credit default swap (CDS) premiums and bond spreads to three-month money market rate. Both these measures are based on the same logic –how much premium do the investors demand for their funding- and widely applied for academic and practical purposes. While the CDSs enabled the comparison between Norwegian-owned DNB and its foreign competitors that do not raise funds at Norwegian bond market as often, the bond spreads revealed the costs of domestic banks of different sizes.

Finally, cost of equity was studied through the inverse of PE ratio. The rationale for deploying this gauge was that it is the simplest way of observing the equity costs (Omran & Pointon, 2004) which is applied commonly in the literature (Aronsen et al., 2014; King, 2009; Maccario et al., 2002).

5.1.2 Profitability

There are many indicators of banks' profitability that are used both by academics and sector professionals. Yet, for this study only the return on equity (ROE) is used. The main motivation for focusing solely on ROE is that it is considered to be the most important indicator of banks'

profitability and growth potential (Casu et al., 2006). Furthermore, this gauge bears particular importance within the regulatory capital discussions as it is highly associated with retaining earnings. Hence, there is an extensive literature based on the impacts of capital buffer establishing and ROE which was briefly presented previously, which makes it curious for this work for studying if the debated impacts are observed in Norwegian banking industry.

5.1.3 Cost of intermediation and repercussions

The lending spreads to three-month money market were deployed as the main measure of cost of bank intermediation following the former research (e.g. Elliott et al., 2012; Miles et al., 2011; Slovik & Cournéde, 2011). Thereafter, in order to see how the changes in lending spreads were reflected in loan market, twelve-month credit growth data according to different borrower types was adopted which enables one to examine the discussions of heterogeneous lending.

The issue of competition was investigated in the light of uneven regulations (both due to transitional floor and SIFI regulations) and corresponding differences in the lending rates. For observing how these factors might have been mirrored in the competitiveness of banks two basic measures of competition were applied: loan market shares and loan growth. While the market shares demonstrated the position of different Norwegian banking groups in the recent years, the loan growth investigation has revealed the curious situation between domestic and foreign banks.

Based upon the movements in the mentioned factors, the main discussions regarding the regulatory equity capital reinforced by Basel III Framework were drawn. Nonetheless, considering the non-empirical nature of the study, alternative causes were also included to the discussions.

5.2 Data

For documenting how bank funding costs, ROE, lending and the competition evolved in the recent years, secondary data was collected from various databases and banks' various financial reports. Most of the databases employed for the study are open for public access such as Statistics Norway (SSB), IMF Financial Stability Indicators Database (IMF FSI), IMF International Financial Statistics Database (IMF IFS), Federal Reserve Economic Data (FRED) and banks' own reports. However, due to the confidential nature of financial data, also

databases that are not open for free access were used. Data regarding DNB's more detailed bond spreads and CDSs were gained through DNB Markets, while other banks' bond spreads were obtained from Nordea Bank via their access to Stamdata Database. In addition, through the university Thomson Reuters Datastream was utilized for retrieving data on banks' PE ratios and CDS spreads.

Since there is no econometric model involved in this study and all the discussions are based on the input retrieved from the named databases, the reliability of these institutions is vital for the value of this work. Seeing that all these data sources are widely used both for academic and business purposes, the probability of input distortion is minimal.

Chapter 6: Descriptive Analysis

This chapter aims to give a descriptive picture of Norwegian banks' choice of method for building equity buffers and how the costs of funding, banks' performance and spreads developed after the introduction of strengthened capital regulations.

6.1 State of capital for Norwegian banks

In line with the regulatory capital requirements, Norwegian banks have been building capital in a fast pace during the recent years. While the average CET1 ratio of six largest⁷ Norwegian banks was approximately 6.7% in 2008, at year-end 2015 this number has reached to 14.1% as a result of increased minimum capital requirements.

When the chart below is examined, the ratio improvement of the two Norwegian SIFIs stands out. It is illustrated that at year end-2008 DNB and Nordea Norge were behind their peers, however, they managed to raise large amounts of capital and starting from 2012 they caught up with the other significant Norwegian banks.

⁷ Based on IMF (2015a), Finanstilsynet (2016b), Winje and Turtveit (2014).

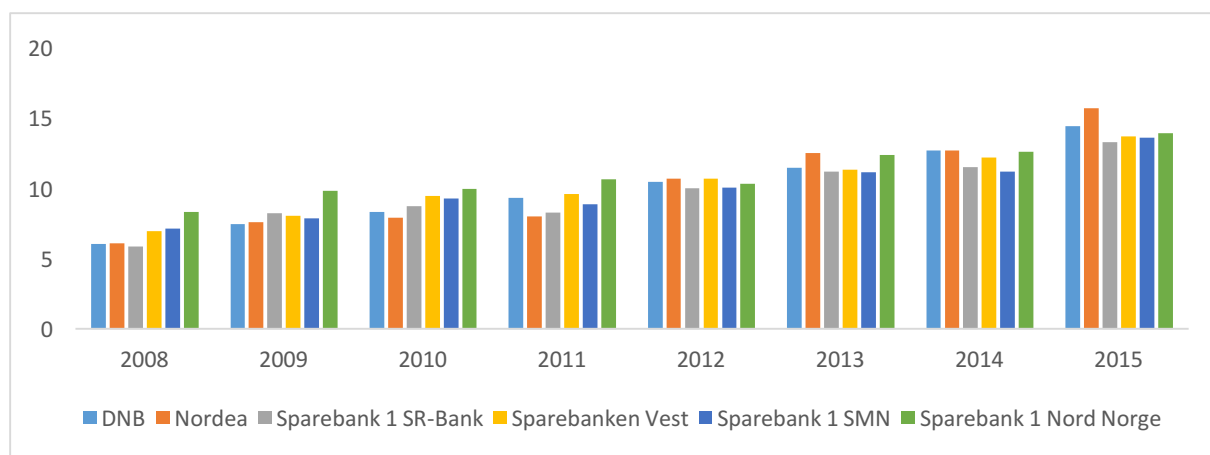


Figure 12. Common equity (CET1) ratio development of SIFIs and large IRB banks. 2008-2015. Percentage points. Retrieved from banks' annual reports.

The financial reports of 2015 indicate that both the SIFIs and the large IRB banks are well capitalized for satisfying the new stringent regulations as reflected in Figure 12. Considering that the common equity ratio including the buffers are to be raised to 11.5% for ordinary banks in Norway as of 1 July 2016, it is evident from the chart that all important banks are well-above this requirement.

As for SIFIs, all three systemically important banks (DNB, Nordea Norge, KBN) satisfied the minimum requirements, however, there seems to be concerns on how to keep the high common equity ratios, and how the regulations will develop further.

As previously stressed, due to stricter capital regulations imposed on SIFIs, Norwegian systemically important banks are to hold a total of 13.5% CET1 capital including the buffers. As the Norwegian SIFIs, Nordea Bank Norge (2016) reports 15.7% of CET1 capital⁸ and 18.4% total capital, while Kommunalbanken (2016) reports a 16.53% CET1 capital and 18.81% total capital in their final reports for 2015.

On the other hand, the most significant Norwegian financial institution, DNB, announced a CET1 ratio of 14.4%, and a total capital of 17.8% (DNB, 2016a). Even though these results are above the minimum requirement of 13.5%, DNB is required to build more common equity capital through 2016, since it is subject to an institutional specific buffer of 1.5% under Pillar 2, which brings their minimum CET1 requirement to 15.0%. Furthermore, DNB (2016a) states

⁸ According to Basel 1 Transitional Floor. For details see Nordea Norge Annual Report 2015.

that they aim to build a management buffer of 0.5%, which translates into a CET1 ratio of 15.5% by the year-end 2017, unless updates on capital regulations arrive.

With respect to the target CET1 ratio of 15.0% by end-2016 means that DNB needs to raise an approximate amount of NOK 9bn in equity throughout this year (DNB, 2016b). Considering the significant market share of DNB for supplying credit, this need of building equity capital creates concerns for Norwegian loan market which will be examined deeper.

Furthermore, the fact that the other banks (both SIFIs and ordinary banks) are above the requirements does not necessarily mean that they will stop holding equity capital; they have been building equity capital reserves fiercely since 2008 as presented above, and will continue in order to meet the requirements as their risk weighted assets grow.

Indeed, Finanstilsynet (2015) reports that even for a 0% annual growth in RWAs Norwegian banks need to gather 21bn NOK to sustain their ratios as presented below:

Table 9. *Estimated capital need for Norwegian banks/banking groups as from 30 June 2016 (NOKbn).*

	0% annual growth in RWAs	2.5% annual growth in RWAs	5.0% annual growth in RWAs
Total, Norwegian banks	21	31	41
CET1 Capital	6	14	22
Hybrid (or higher quality) capital	12	13	14
Supplementary (or higher quality) capital	3	4	5

Source: Finanstilsynet (2015).

While banks keep more and more equity capital as regulations reinforce, this tendency creates doubts about how this behavior will affect the loan market and also the competitiveness of these banks. The analysis will be mainly based on DNB and Nordea Norge, since KBN is 100% state owned and lends to public institutions rather than households and commercial business.

6.2 How the equity buffers were built?

As presented earlier, the Norwegian banks have assembled large amounts of CET1 capital between 2008 and 2016. But how the banks managed to live up to the elevated regulations is a curious question.

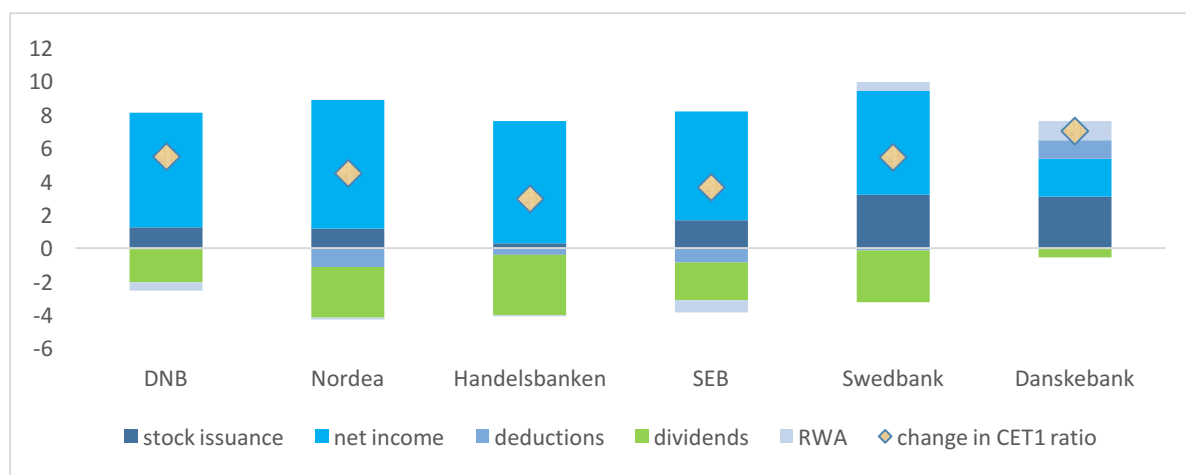


Figure 13. Decomposition of change in CET1 for large Nordic banks. Percentage points. December 2007 – December 2013. Adapted from Aronsen et al. (2014).

When the situation is investigated for big Nordic groups operating in Norway, as presented in Figure 13, it seems they mostly utilized their earnings. Figure 13 illustrates that except for Danske Bank, all Nordic groups gathered more equity by retained earnings than by equity issuance, in line with Pecking Order Hypothesis. Danske Bank, on the other hand, achieved a larger change in CET1 ratio conforming to the discussions asserting that external equity is a faster and more efficient way of building buffers.

Examination of Norwegian SIFIs, DNB and Nordea, reveals that the contribution of stock issuance for them is relatively lower than the other Nordic peers, such as SEB, Swedbank and Danskebank. As regards to how much equity they raised by issuing equity in the years following the crisis until now, Nordea reports a rights issue of EUR 2.5bn carried out by the mother bank in 2009⁹, while DNB raised NOK 14bn in the same year¹⁰. As for the smaller financial institutions in Norway, it is reported that they raised a total of NOK 5.8bn together between 2009-2014 (Aronsen et al., 2014).

When it comes to the six largest Norwegian IRB banks the situation is similar: banks built buffers primarily by retaining earnings as presented in Figure 14. Hence, it can be stated that in line with Kashyap et al.'s (2010) discussions, banks in Norway preferred to behave within the Pecking Order Hypothesis's arguments.

⁹ See Nordea Summary Report 2009.

¹⁰ See DNB Annual Report 2009.

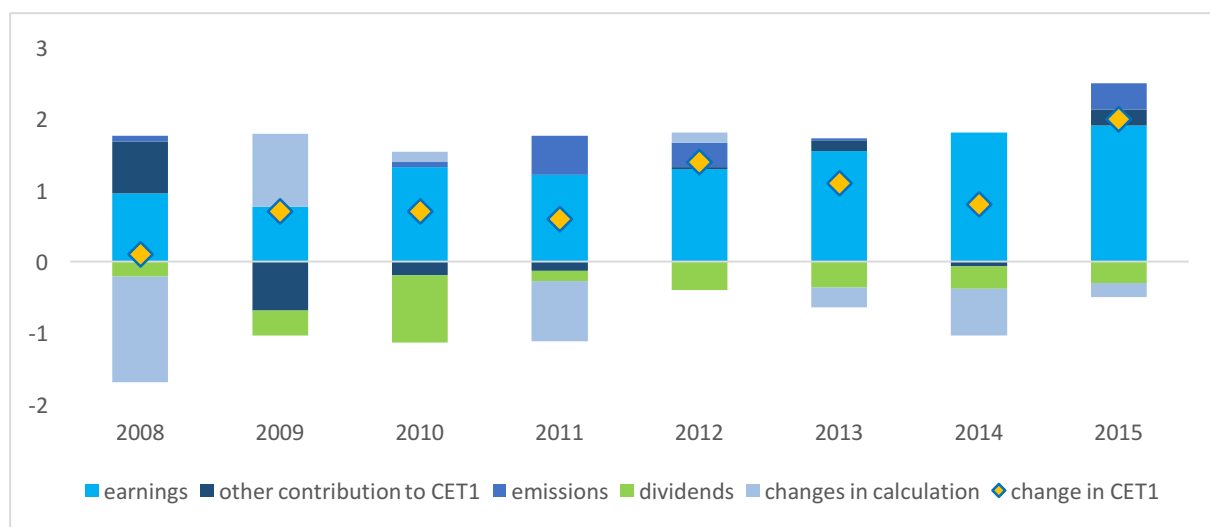


Figure 14. Decomposition of change in CET1 for six largest IRB banks in Norway. Percentage points. 2008-2015. Adapted from Finanstilsynet (2016b).

Concerning the illustrated dominant role of retained earnings for meeting capital requirements in Norway, the following analysis will mainly be based upon previously emphasized impacts of retaining earnings on economy.

6.3 Bank funding costs

6.3.1 Cost of deposit funding

Being the backbone of traditional banking, deposit funding continues to dominate the Norwegian banks' funding. As of end-2015 the share of deposit funding was 39.0% for the banks operating in Norway, making it the leading source of funding¹¹.

Considering that banks pay interest over the deposits placed by customers, the most vital element of deposit cost for the banks is the interest paid (offered deposit rates) on it. However, looking at the deposit rates without taking the market conditions into consideration can be inadequate for determining the trend in deposit costs. Therefore, it is a common practice to examine deposit spreads to a benchmark rate (Berkelmans & Duong, 2014).

The deposit spread in Norway is computed by subtracting the average deposit rate from 3-month NIBOR, which is the main reference rate in the Norwegian market (Norges Bank, 2013). In order to get an overall picture of deposit rate development in the recent years the average

¹¹ See Figure 6.

deposit spread to 3-month NIBOR was computed for the 2009-2016 period as Figure 15 presents:

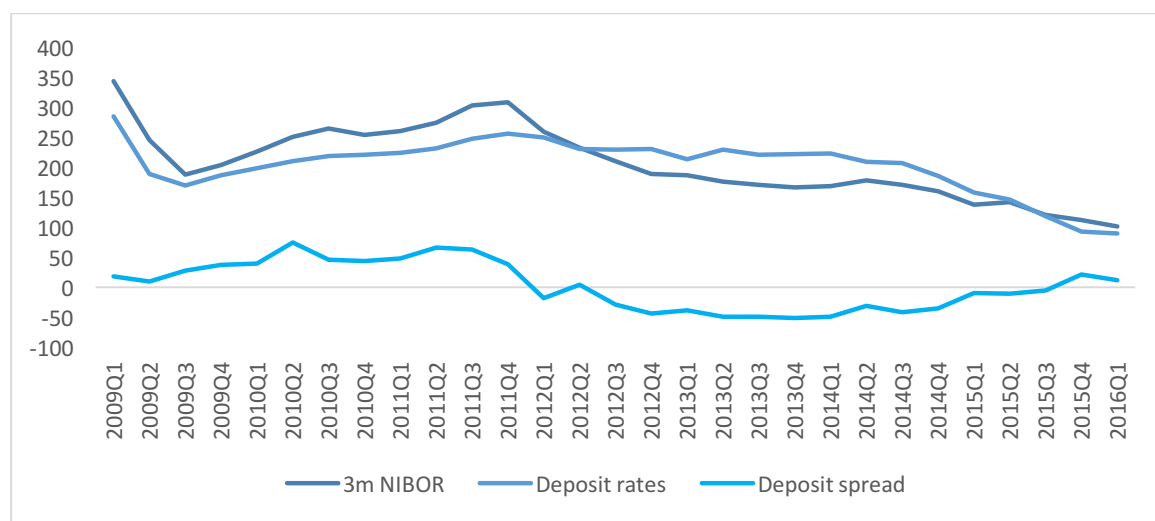


Figure 15. Average deposit spread of Norwegian banks. Between 2009Q1-2016Q1. Basis points. Data retrieved from Statistics Norway.

Since the spread decreases as deposit rate increases¹², the chart indicates that deposits became costlier for the banks starting from 2012, where the spreads became negative (i.e. deposit rates were above three-months money market rate). This tendency of the deposits appears to have persisted until 2015, when the deposit spread became positive again. The increase in the overall deposit rates until this period raises interest regarding a potential funding competition since banks tend to increase their deposit rates for attracting retail customers in times of increased funding need (Craig & Dinger, 2013).

6.3.2 Cost of wholesale market funding

The funds raised in wholesale markets have a crucial role in Norwegian banking sector, where unsecured senior bonds and covered bonds make up 29.0% of total bank funding as presented previously¹³.

As calculating the overall funding costs of a bank is a highly complex procedure due to different interest rates the liabilities composing the costs are subject to, costs of wholesale funding is often used as a proxy for banks' marginal cost of funding which reflects the price of raising an additional unit of funding (Babihuga & Spaltro, 2014). Hence, the price of market funding is of special interest in comparison to other sources of funds.

¹² Deposit spread = 3-month NIBOR – deposit rate.

¹³ See Figure 6.

In pursue of investigating the Norwegian banks' wholesale funding costs during the years when huge amounts of capital were established, both CDS premiums and floating rate bonds' spreads to Norwegian money market rate (NIBOR) were employed according to data availability. Norwegian SIFIs' funding costs were investigated in comparison to their foreign peers by utilizing CDS data, with a special focus on DNB given the Basel I Floor it is subject to. On the other hand, Norwegian banks of different sizes (SIFIs, medium-sized banks using IRB methods, smaller banks) were studied separately, through bond spreads to three-month NIBOR.

Credit Default Spreads

Credit default swaps (CDS) measure the cost of insuring against default on unsecured bonds, providing a useful indicator for the cost of senior debt, as they are likely to capture the marginal unsecured cost of funds (Babihuga & Spaltro, 2014).

As addressed previously, the Basel I Floor applied in Norway creates troubles for Norwegian banks that employ IRB models, forcing them to build more equity capital than their foreign peers to meet the same CET1 capital ratio. In order to observe if there is any vital difference between the spreads of the only Norwegian-owned SIFI of Norway, DNB, and the foreign branches with significant shares in the Norwegian market, the five year senior CDS premiums of a sample of banks are presented in Figure 16:

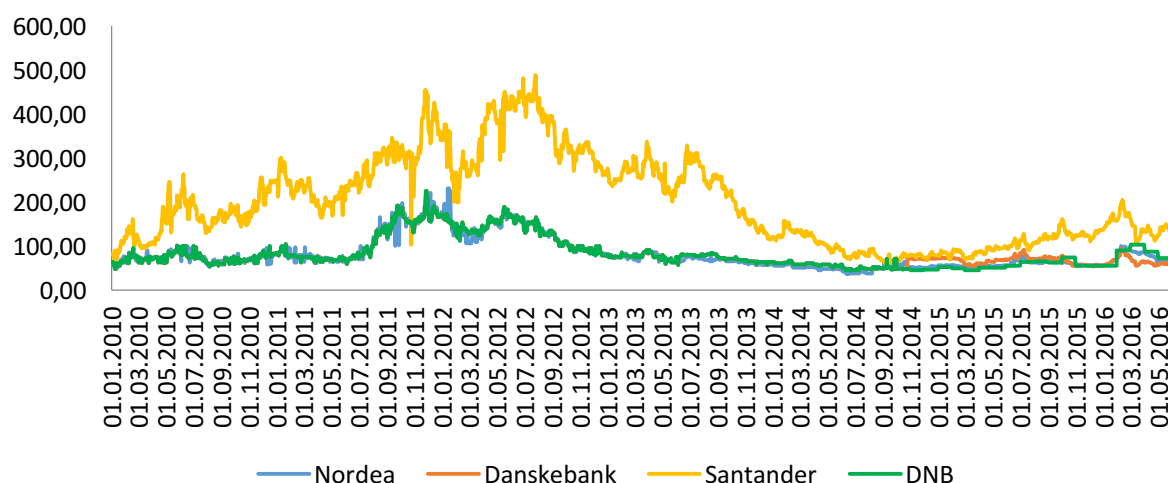


Figure 16. Five year senior CDS premiums for a sample of banks operating in Norway. 01.01.2010-31.05.2016. Data retrieved from Thomson Reuters Datastream, DNB Markets.

The CDS premiums indicate that the Nordic banking groups included have very alike wholesale funding costs, both during good times and bad times. According to the graph, the costs have

increased for all the banks included in the graph at varying levels during 2011-2012. The reason for the increased spreads during that period was the European Debt Crisis which increased the CDS spreads dramatically in the European markets due to spill overs of the credit crisis that hit Greece, Iceland, Ireland, Portugal and Spain (Arezki et al., 2011). Hence, while the Nordic groups' CDS spreads elevated rather mildly, their Spanish-owned peer Santander who also operates in Norwegian market suffered from substantially heightened costs.

As aforementioned, there are concerns regarding DNB's market funding since even though they have more CET1 capital, due to floor differences they are to report lower capital ratios when compared to other Nordics. Thus, considering their weaker solvency on paper, it is debated the investors could raise the premiums (see Grimsby et al., 2016; Skjæveland et al., 2015). Thus, it is of importance that DNB did not get outperformed by their Nordic peers for raising funds, which may indicate that the debt investors did not have a particular negative approach towards DNB's lower ratios and extra burden.

Bond spreads to three-month NIBOR

The IBOR spreads are particularly good indicators for the bank funding costs, as they reflect the actual cost of raising funds while CDSs are proxies of the funding costs (Beau et al., 2014). Therefore, in order to depict the cost of medium-and long term wholesale funding for Norwegian banks within the Norwegian market, the spreads of five year unsecured senior bonds and covered bonds with floating rates to three-month NIBOR were employed.

The bond spreads to three-month NIBOR were calculated based on daily data retrieved from Stamdata¹⁴, and unweighted averages for each quarter were calculated from these numbers. For the very few time spots missing data, basic approximations were applied utilizing the bank's bond spread in the closest time frame with the same maturity available in the data, following Beau et al. (2014). For investigating if there is any major difference between the banks of different sizes when raising market funds, the Norwegian banks were divided into three main groups: SIFIs as they are subject to stricter capital regulations under Basel framework, medium

¹⁴ Stamdata.no | 26 April 2016 | Tranche Based | Issued Amount Tranche NOKm | Banks and Finance | Including Bonds, Credit Linked Notes and Linked Notes, retrieved through Nordea Bank.

sized banks who can achieve a competitive advantage with the lower requirements when compared to SIFIs, and the smaller savings banks.

The SIFIs consist only of DNB and Nordea Norge, since the third SIFI selected by Norwegian authorities, KBN, operates in public sector. The numbers representing the SIFIs are mostly based on DNB, since Nordea Norge did not raise funds in Norwegian market as much as DNB, and more detailed information regarding DNB's spreads were gained through DNB Markets. The medium sized banks are represented by Sparebank 1 SR-Bank, Sparebanken Vest, Sparebank 1 SMN and Sparebank 1 Nord Norge since they comprise the largest Norwegian banks together with DNB and Nordea Norge (Winje & Turtveit, 2014, Finanstilsynet 2016b). The small banks making up the rest of the data are the regional banks scattered around in Norway.

With an attempt to see if there are any co-movements between the market funding costs and elevated capital requirements, the historical Tier 1 Capital to RWA ratios of Norwegian banks were added to the analysis. As explained previously Tier 1 capital is not only common equity (CET1) but also may include Additional Tier 1 capital (AT1) such as the preferred stocks which is not to exceed 1.5% of RWAs (Scope Ratings, 2016). Due to available data retrieved from IMF Financial Soundness Indicators Database, Tier 1/RWA ratio was used for reflecting how much high quality capital was built during the studied time frame.

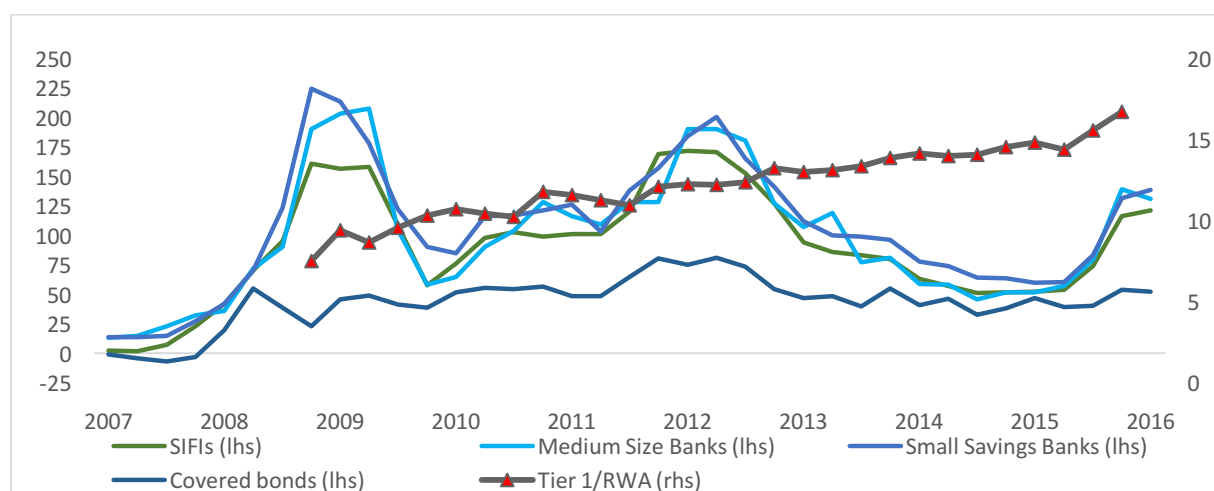


Figure 17. Norwegian banks' 5-year senior unsecured and covered bond spreads to 3m NIBOR 2007Q1-2016Q2 (bps), and regulatory Tier 1 Capital/RWA ratios 2008Q4-2015Q4 (percent). Data retrieved from Stamdata, DNB Markets and IMF FSI.

As Figure 17 illustrates, the fluctuations in market funding costs seem to lack a co-movement with the levels of high-quality capital built for the investigated time period. The data shows that

while the SIFIs had access to cheaper funding, small savings banks struggled the most due to their higher risk premiums. The difference between the banks of different sizes were widened during the crises times, and the SIFIs do not appear to lose their advantageous position for raising market funds through the years.

The data shows that before the subprime crisis hit the markets, the market funding was much cheaper in comparison to following years. The costs seem to have reached a maximum during the subprime crisis of 2008-2009 but there is also another period that attracts attention. It is observed during 2011-2012 spreads to NIBOR increased extremely as a result of European debt crisis and the NIBOR spreads developed in a similar trend with the CDSs presented previously. There are two points of interest that could bring curious discussions regarding the theories on bank funding and capital regulations presented in the previous chapters. Firstly, the period between 2013-2015 when banks enjoyed a low-cost era, Basel III framework was incorporated into Norwegian law and the banks (particularly the SIFIs), were required to build CET1 capital fiercely as illustrated formerly¹⁵. Secondly, it is observed that while banks had access to cheaper funding before the sub-prime crisis through very low spreads to NIBOR (as low as 2 bps for DNB¹⁶), even though there were periods that spreads were lowered, it has never gone back to the pre-crisis levels. Considering the stringent CET1 regulations are products of the subprime crisis, this behavior needs to be investigated deeper.

6.3.3 Cost of equity

When the cost of bank funding is investigated, the focus is mostly on deposits and wholesale funding for they make up most of the funding share. However, since this study investigates the outcomes of increased equity funding, a simple measure of cost of equity will be included.

As mentioned previously, the inverse of PE ratio method is deployed for studying the cost of equity. The rationale of the inverse of PE ratio is that the cost of equity equals the return on any retained earnings (Aronsen et al., 2014). Hence, it is suitable in a Norwegian context since retaining earnings for building CET1 capital is the main choice of the banks in Norway.

¹⁵ See Figure 12.

¹⁶ Based on information gained from DNB Markets.

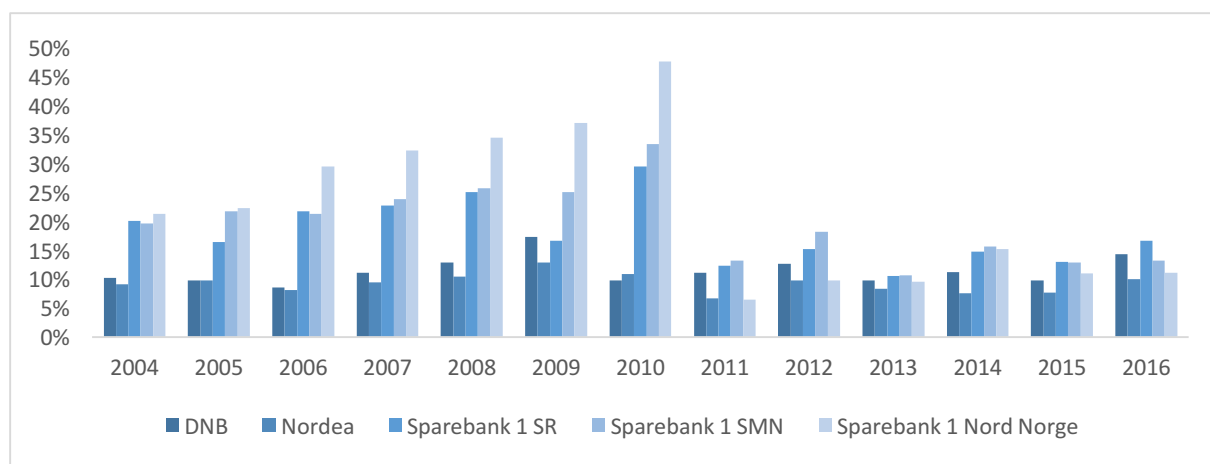


Figure 18. Cost of equity for large Norwegian banks between 2004-2016 (NOK). Percent. Data retrieved from Thomson Reuters Datastream.

Figure 18 illustrates the cost of equity computed for five largest Norway-based banks (including Nordea Norge) for the recent years. It shows that the cost of equity was rather stable for SIFIs through the years in comparison to their medium-sized peers. While the medium-sized Norwegian banks had high costs of equity in the previous years, they have improved significantly after 2010. According to King (2009) such differences between banks can be explained by different profitability levels of banks as inverse of PE is based heavily on the profitability.

6.4 Banks' profitability

As pointed out previously, ROE is considered to be most important indicator of banks' profitability and growth potential (Casu et al., 2006). The theories presented earlier focus on the adverse effects of capital regulations on this vital gauge. The mainstream expectation is that the return on equity will be lowered as a natural outcome of lowered riskiness of the bank and the efforts of building equity capital through retaining earnings (Admati et al., 2013).

The numbers below show how the annual ROE of notable banks with large market shares developed in relation to the average ROE of all banks in Norway. The data reveals that before the subprime crisis the included banks had very high levels of returns when compared to the average returns in Norwegian banking which was significantly lowered during the crisis. The Norwegian banks suffered the lowest returns of the last ten years in 2008, however the returns did not go negative as it did in many countries. What is interesting in this episode is that in the years after the subprime crisis, the selected banks' return levels never went back to the pre-

crisis levels where they gained much higher returns than the average. It is observed that recently these banks are more or less leveled with the average. This tendency bears importance since this is debated to be a negative outcome of the capital regulations by aforementioned studies.

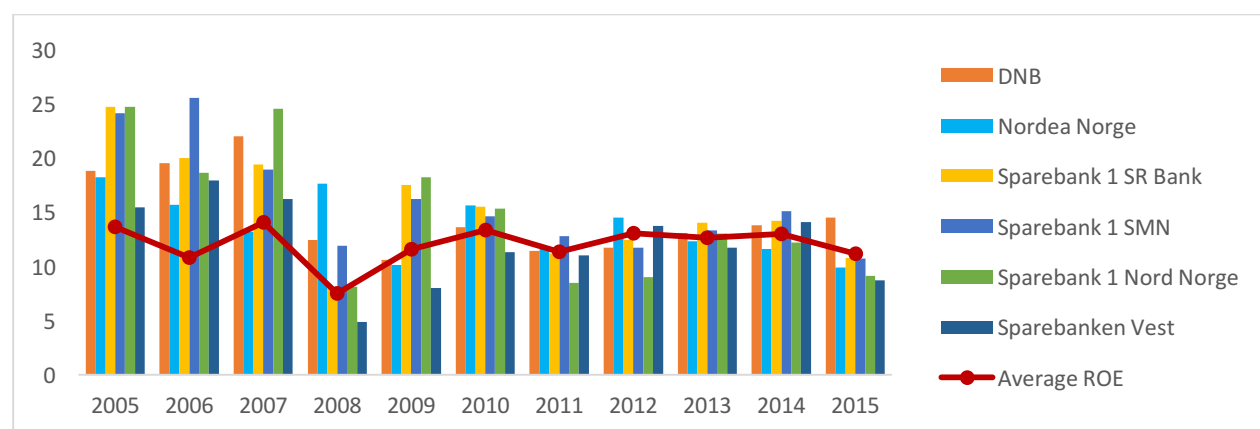


Figure 19. ROE of a sample of Norwegian banks 2005-2015. Percent. Based on IMF FSI Database and banks' annual reports.

While the downward trend is obvious for the large banks in the sample, Norwegian banks still report much higher ROE when compared to their EU peers¹⁷. This behavior is appealing considering Norway is one of the flag-bearers for introducing Basel III/CRD IV ahead of many EU countries (Moody's Investor Services, 2014). Considering that all banks regardless of their sizes were to build capital during the given period, it raises the question if the lending spreads were widened in Norway for boosting earnings and keeping ROE at reasonable levels as Chun et al. (2012) addressed.

6.5 Cost of intermediation and repercussions

6.5.1 Average lending spreads

One of the major worries associated with the increased equity capital requirements is the potential increase in lending spreads leading to more expensive loans for the society, which means that banks do not internalize the costs of regulation and pass it on the public for building capital (Cohen & Scatigna, 2016; Elliot et al., 2012; Hanson et al., 2011; Kashyap et al., 2010; Miles et al., 2011; Slovik & Cournède, 2011). In pursue of capturing signs for such behavior in the Norwegian banks, the lending spreads, deposit spreads and overall interest spreads are to be examined in this section.

¹⁷ See Figure 7.

The interest spread is the difference between the lending rates and deposit rates. When it comes to the lending and deposit spreads, they are to be investigated together with a benchmark rate showing the condition of these rates in relation to macroeconomic environment. In the Norwegian banking industry lending spread and deposit spread are measured as follows¹⁸:

$$\text{Lending spread} = \text{Lending rate} - 3m \text{ Nibor}$$

$$\text{Deposit spread} = 3m \text{ Nibor} - \text{Deposit rate}$$

The relationships imply that lending rates become costlier for the society as the rates get larger than the benchmark rate which translates into increased earnings for the banks. On the other hand, the deposit rates become beneficial for the public as they get closer or even higher than the benchmark rate, while it means higher cost of deposit for the banks.

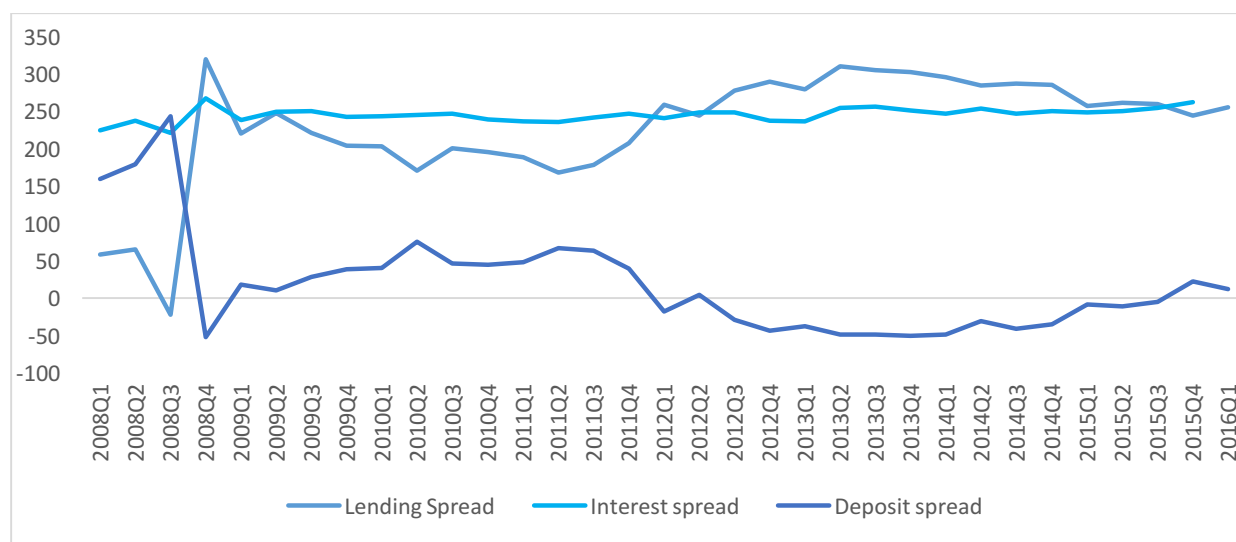


Figure 20. Average lending, deposit and interest spreads for banks in Norway 2008Q1-2016Q1. Basis points. Data retrieved from Statistics Norway, IMF FSI.

Figure 20 illustrates how the spreads in Norway developed in the recent years. As the theories predict, the lending spread is in an increasing phase since 2012. This movement is curious since as the graph illustrates, the lending spreads were as widened only in the last quarter of 2008, when the subprime crisis was still at its height, and only for a short while. Statistics Norway (2009) explains this quarter of high spreads with the strong key policy rate decrease reflected in loan rates with a delay and high funding costs due to crisis climate. In the aftermath of the crisis, while the average lending spread was bouncing up and down around 200bps until 2012, it started raising from that time and reached up to 310bps in 2013Q2. Even though it is not as

¹⁸ See Norges Bank (2013).

high as that peak point now, it is of interest that it did not go back to the initial level and seems to persist.

The interest spread was rather stable since the increase in the lending spreads was offset by higher deposit rates. The graph indicates that the lending and deposit spreads have changed almost symmetrically; while the lending spreads were rising, the deposit spreads were declining in a similar form (i.e. the banks were quoting high deposit rates). However, the interest spread's stable position due to the counteracting of lending and deposit spreads does not mean that the earnings of the banks were stable as well. On the contrary, given that the loans to households are substantially larger than deposits from households, the given movement of the spreads strengthened banks' earnings (Norges Bank, 2013).

Therefore, even though the customers got good deals on the deposit side, it is crucial that the borrowing became more expensive during this period. Furthermore, how the different customer groups that needed credit in the recent years were affected by this increase is a curious question. Towards inspecting this issue, the spreads quoted for different segments were gathered as presented in the below chart:

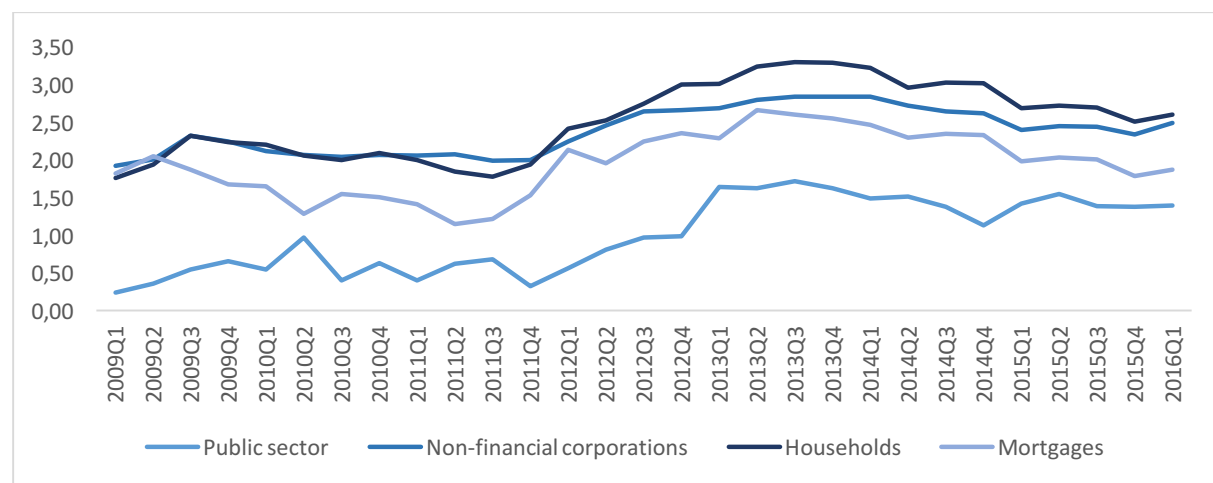


Figure 21. Average bank lending spreads according to the borrower sector. 2009Q1-2016Q1. Percentage points. Data retrieved from Statistics Norway, FRED.

Figure 21 shows that the households (excluding mortgages) are the segment that are subject to highest spreads followed by the non-financial businesses and mortgages while public sector enjoys lowest spreads, and thus cheapest borrowing quotes. As expected the mortgages and lending to public sector has lower spreads, since they bear less risk for the bank. It is of interest that all segments including the public sector experienced higher spreads starting from 2012 in

accordance with the previous chart indicating the average. This upward trend in the lending spreads is a curious issue that needs further discussing in the next chapters.

6.5.2 DNB'S lending spreads

Under Basel III, the SIFIs are to meet higher equity capital regulations as aforementioned. This brings discussions regarding the systemically important banks' competitiveness as they might have to widen their lending spreads more for retaining earnings and assembling equity capital as a result of imperfect competition requiring them to build larger capital buffers (Drumond & Jorge, 2013).

As stressed before there are three SIFIs in Norway; KBN, which operates in the public sector, Nordea Norge and DNB. However, of the three, DNB carries enormous importance, not just for being a SIFI but also for owning 1/3 of the overall loan market¹⁹. Hence, the lending spreads quoted by DNB are of paramount significance for the Norwegian economy.

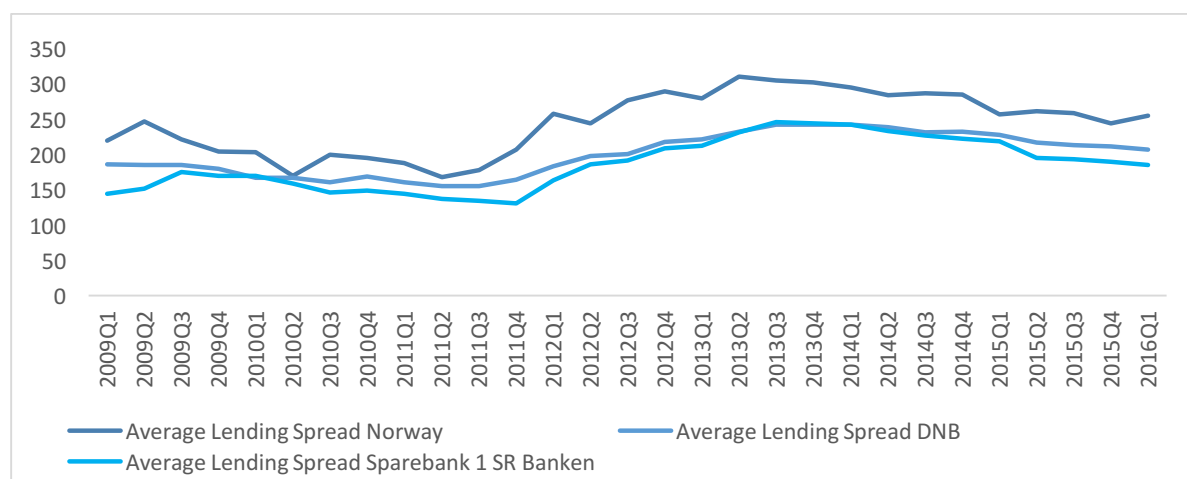


Figure 22. Average lending spreads quoted in Norway and DNB's average lending spreads 2009Q1-2016Q1. Basis points. Data retrieved from SSB, DNB and Sparebank 1 SR-Bank's quarterly reports.

Figure 22 indicates that in spite of the widened lending spreads in line with the overall trend in the Norwegian banking sector, DNB is still well-positioned to offer cheaper lending than the average. One of the important rivals of DNB in the Norwegian loan market, Sparebank 1 SR-Bank is also added to the analysis for investigating if a non-SIFI IRB model bank gets to offer much cheaper lending. While SR-Bank has slightly lower spreads than DNB, it's not accurate

¹⁹ See Table 7.

to argue that its due to less capital it needs to gather. As the numbers reveal, SR-Bank was offering cheaper lending already in 2009Q1.

It could be curious to observe how banks of different sizes and risk-weighting groups (i.e. IRB or non-IRB) have shifted their lending spreads in the given period. Unfortunately, not all the banks are willing to share clear information about their lending spreads, and even if they do, they have different segment definitions²⁰ which makes the comparison between banks very difficult and probably misleading. Yet another issue that makes the comparison of lending spreads uneven is the concentration of Norwegian banking sector. While DNB dominates the loan market by 30%, the closest followers are Nordea Norge with a market share of 10% and Sparebank SR 1 Banken with around 5% (Winje & Turtveit, 2014), indicating very large differences in the amount of money supplied to the economy, which could influence the rates quoted heavily through, which will be examined further under discussions. Nevertheless, DNB's segment spreads are investigated in pursue of observing how different borrowers were influenced, considering that DNB gives the most detailed lending margin data²¹:

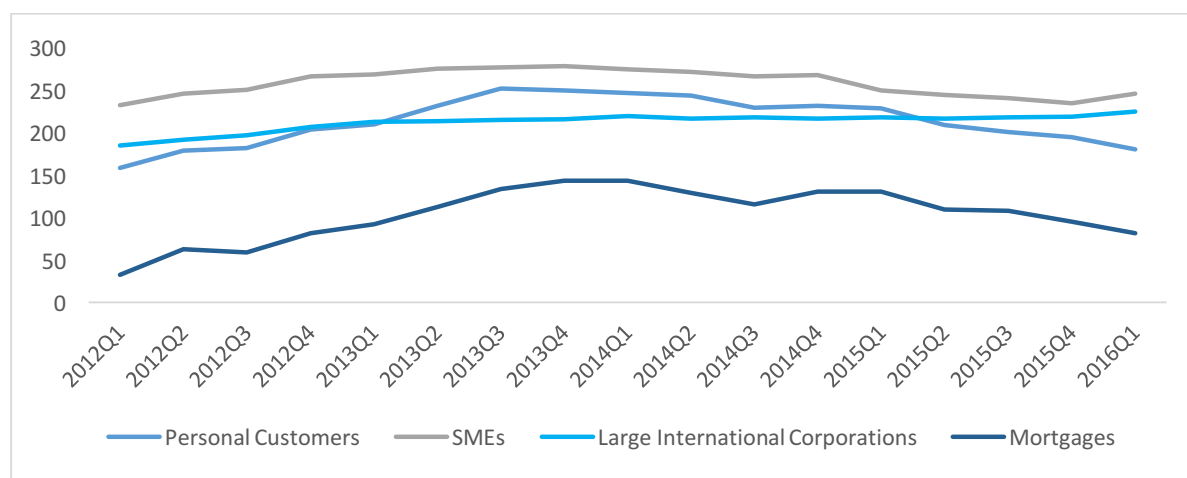


Figure 23. Lending spreads of DNB according to different segments 2012Q1-2016Q1. Basis points. Data retrieved from DNB's Factbooks and Supplementary Information Reports.

In accordance with the overall tendency in banking industry, the mortgages are far cheaper than the other loan types due to their secured nature. The SMEs on the other hand, are subject to the

²⁰ The loans to SMEs and/or mortgages are included to retail market in many banks' reports which makes the comparisons unclear.

²¹ Since DNB has changed their classification of customers in 2013, the oldest data regarding their segments is from 2012. Even though this timeframe is rather short, DNB's quotes bear importance for capturing cost of borrowing for groups of interest during the time of raised margins, such as the SMEs, which are not documented separately by other banks.

most expensive loan rates as expected with regards to their higher risk of default, hence larger risk weight, followed by personal loans and large corporations.

6.5.3 Lending growth

One natural concern that is related to the rising lending margins is the potential adverse impact on the lending. It was illustrated earlier that the banks' lending spreads were in an increasing phase since 2011Q4, with a peak in 2013Q2. In order to investigate how this behavior was reflected in the lending growth, data indicating 12-month credit growth was gathered based on different borrower segments.

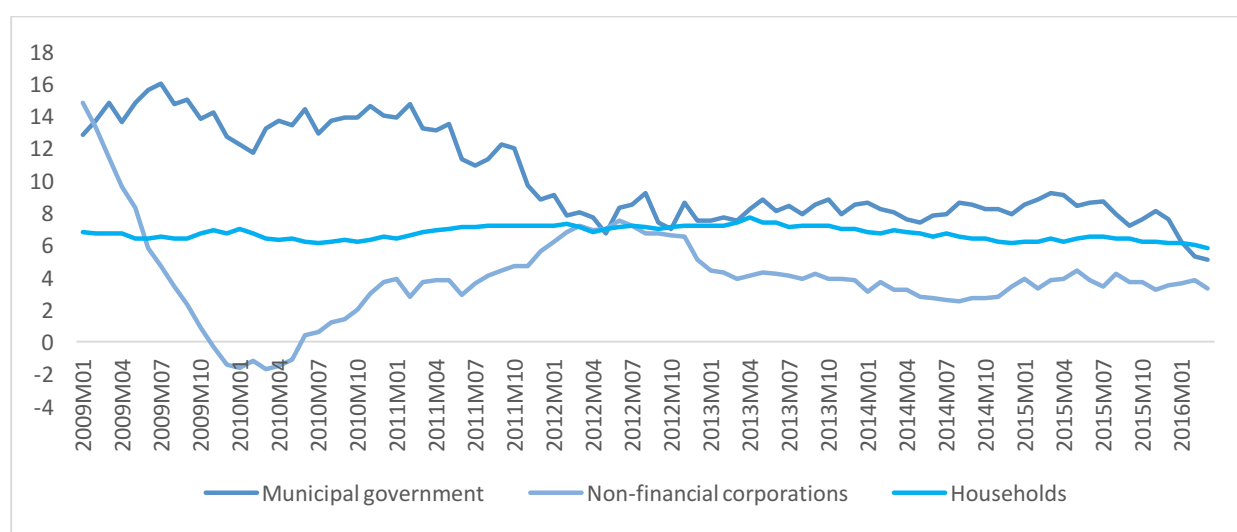


Figure 24. Twelve-month credit growth by borrower type, 2009 January- 2016 January. Percentage points. Data retrieved from Statistics Norway.

Looking at the segments of interest presented in Figure 24, it is observed that the credit growth to non-financial corporations entered into a declining period starting from 2012Q2, while the lending to households was more stable. The credit growth for non-financial corporations declined from 7.5% in June 2012 to 3.1% in January 2014. While this is not a drastic change reaching negative values as in it was experienced in 2010, this trend bears importance within the arguments presented previously.

When it comes to the households, considering that the household segment here also includes mortgages, how the mortgage lending and other household loans developed separately is of interest. The twelve-month credit growth numbers show that they did not experience the decline as the non-financial corporations and they had rather stable credit from the banks. However, considering the housing-bubble in Norway which was addressed in challenges earlier, investigating the mortgage lending's development within household loans is vital.

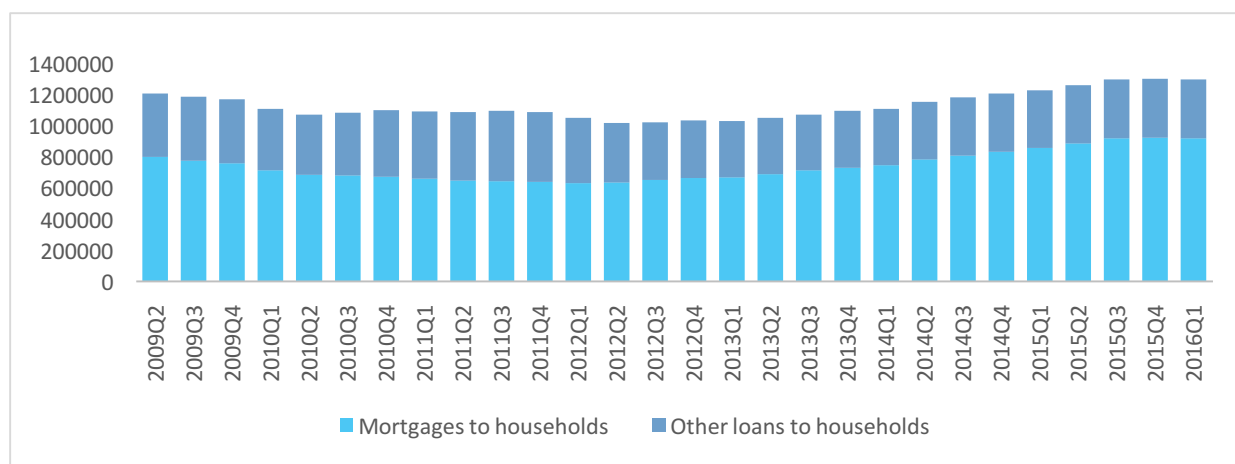


Figure 25. Banks. Loans to households (NOK million). 2009Q2-2016Q1. Data retrieved from Statistics Norway.

Figure 25 shows that the loans granted to households by banks are increasing in the recent years. When the breakdown of the lending is investigated, it is noticed that the hike in lending to households is carried out by mortgage lending which has an increasing share in the overall households' loans. These trends characterizing with giving more room for mortgages, while reducing corporate loans through heightened lending margins can be interpreted as balance sheet adjustments for satisfying the capital ratios.

One of the discussions associated with increased lending spreads and accordingly lowered lending growth to corporates was its negative impact on GDP. When Norway's GDP development presented as percentage is investigated, the results demonstrate a slower growth as of 2013 as shown in Figure 26. However, it would rather be a long stretch to associate this change solely with banks' spreads for the given period, which will be examined further under discussions.

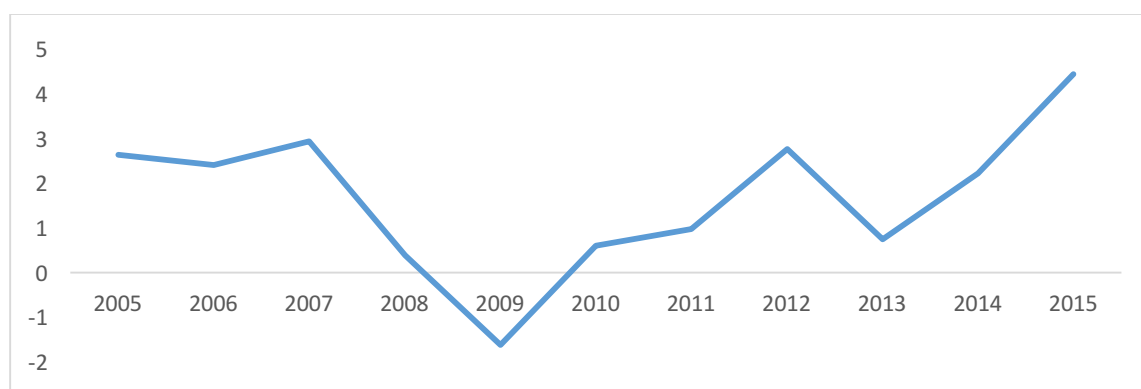


Figure 26. Norwegian gross domestic product. Real. Percentage. 2005-2015. Data retrieved from IMF IFS.

6.5.4 Competition

The CET1 capital requirements for banks of different sizes (e.g. SIFI and non-SIFI banks) is a source of concern for competitiveness as addressed earlier. However, in Norway the imperfect competition discussions have a second dimension due to the application differences of Basel framework between Norwegian banks and foreign branches.

The simplest way of investigating how the competition resulted for both the Norwegian banks and the foreign branches is to examine the market shares for the recent years when the regulations reinforcing the imperfection were introduced:

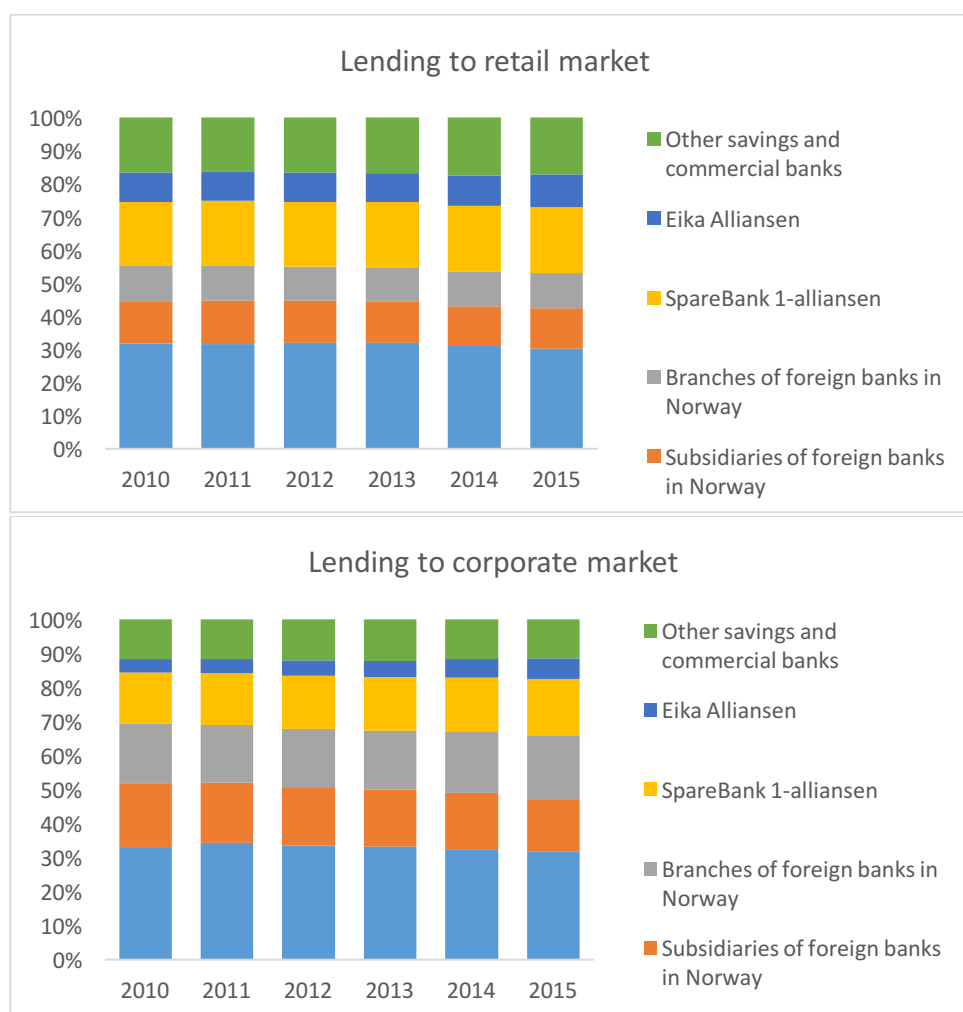


Figure 27. Gross lending to retail and corporate markets between 2010-2015. Percentage points. Based on Norges Bank Financial Stability Reports 2010-2015.

The market shares do not indicate any drastic change in the market structure in the last five years where both the SIFI regulation and the Basel I Floor were introduced. The market shares seem to have remained the same in spite of minor movements. Nevertheless, there are some points worth mentioning. Even by small amounts, the data above shows that while Eika

Alliansen and Sparebank 1 Alliansen increased their market shares both in corporate and retail markets, DNB lost a minor stake which carries importance for domestic competition. In 2010 the market shares of DNB, Sparebank 1 Alliansen, and Eika Alliansen for lending to retail market were 32%, 19.2% and 8.8% respectively. In 2015 these numbers have developed to be 30.2%, 19.9% and 9.9%.

When it comes to corporate market, there is also a similar trend for the Norwegian owned banks. DNB's market share of 34.3% in 2011 has gone down to 31.8% in year-end 2015, while Sparebank 1 Alliansen and Eika Alliansen both increased their shares to 16.8% (15.1%) and 5.9% (4.2%).

Looking at the issue from the perspective of foreign branches, it is observed that they have gained better results in the recent years in the means of competition for corporate loans. Branches of foreign banks in Norway had a corporate market share of 17% in 2011, which raised to 18.9% by 2015. On the other hand, as addressed above, DNB's market power was reduced from 34.3% in 2011 to 31.8% in 2015²².

Whereas the market shares do not reflect large changes except for small ground losses for DNB, the increasing existence of foreign branches in the loan market can be observed strongly through loan growth rates for retail and corporate segments as presented in Figure 28 and 29:

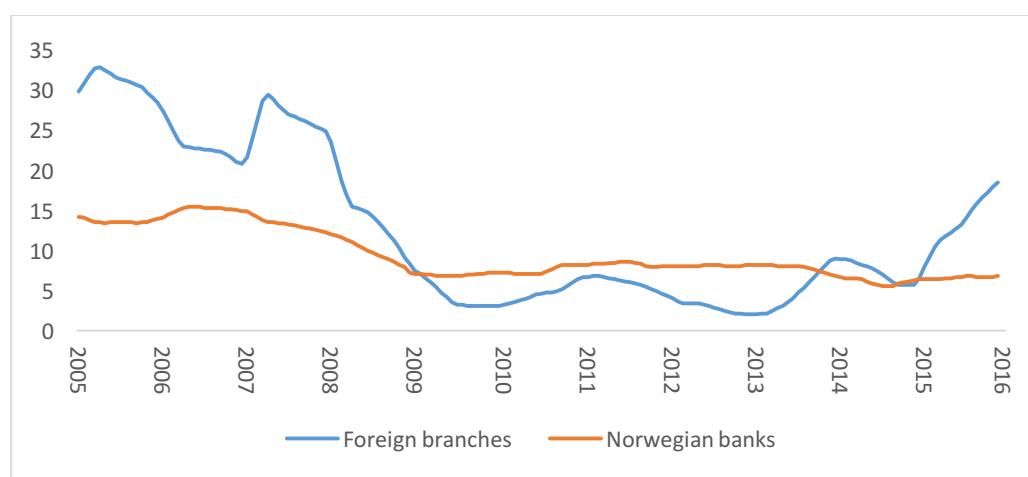


Figure 28. Loan growth in retail market 2005-2016. Percentage point. Adapted from Finanstilsynet (2016a).

²² For details see *Norges Bank Financial Stability Report* for years 2010-2015.

According to the information obtained from Finanstilsynet (2016a), both Norwegian and foreign banks' loan growth have decreased since the subprime crisis. After 2009, while domestic banks seem to have a more stable performance, the foreign banks have a more fluctuating growth in retail loan market. Nevertheless, it catches the eye that starting from 2014 the foreign branches operating in Norway achieved higher growth in the household loans market than their Norwegian peers. In recognition of the fact that the recalibration of Norwegian IRB banks' mortgage risk weights was carried out in 2014, this development bears importance.

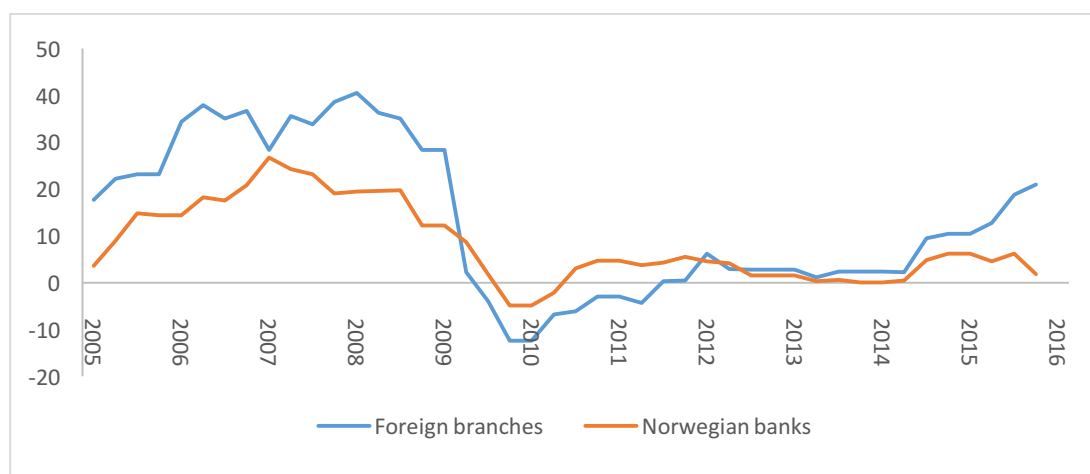


Figure 29. Loan growth in corporate market 2005-2016. Percentage points. Adapted from Finanstilsynet (2016a).

Like the retail lending growth, corporate lending growth declines after the subprime crisis as the graph demonstrates. However, when compared the decline in corporate market is much steeper than the retail market. When it comes to the performance of domestic banks and the foreign branches in Norway, the loan growth of foreign banks goes slightly over the Norwegian banks' as of 2012, however the difference between the two begin widening around mid-2014, peaking at year-end 2015.

Chapter 7: Discussions

This chapter aims to argue the trends observed in Norwegian financial industry within the theories presented in literature review regarding the capital regulations. Since it is a discussion-based and not an empirical study, the goal is not to draw any precise causality, but to point out the potential issues through utilizing former research as a reference point.

7.1 Funding costs

7.1.1 Cost of deposits

The analyses have shown that, in the years following the stricter capital regulations the cost of deposits mirrored in the average deposit spreads were in an up-movement which started to recover in late-2014 and 2015. This trend is curious since it was anticipated that as equity funding's share increases in the funding pie through capital buffers, the need for deposit funding would decline, and therefore the rates quoted for deposits would be lowered, with an MM Theory insight (ECFIN, 2011).

One could think this widening in the deposit spread as a making of the strengthened capital regulations, nevertheless, that would be a rather long stretch. There are several, nested reasons why the deposit spreads were enlarged in comparison to three-month money market rate starting from 2011. As it was mentioned as a probability in the analysis section, the negative spreads were mostly an outcome of heightened competition for funds in the market (Craig & Dinger, 2013). However, this competition was not related to the building of the capital buffers. Finanstilsynet (2013a) reports that because of the extremely high premiums in the wholesale market during the European Debt Crisis, the banks had to compete for deposit funding and the simultaneous fall in the NIBOR rate during that time put extra pressure on the deposit rates leading to increased spreads. However, while the difficulties in wholesale markets started to heal substantially for Norwegian banks as of 2013, the negative deposit spreads endured.

This persistent trend in the deposit spreads can be explained within the new Basel regulations, however not the capital regulations. It is asserted that the new liquidity requirements, particularly the NSFR, requires banks to get more stable funding, which may result in a competition for deposit funding placing stress on the deposit rates (Molland & Erard, 2012; Norges Bank, 2013). Indeed, Finanstilsynet (2014a) discloses that from 2011 Norwegian banks were to report their NSFR, and between 2013-2014 they had to raise the available stable funding by NOK51bn, which could have substantially contributed to intensifying the keen competition for depositors.

7.1.2 Cost of wholesale funding

As highlighted previously, cost of wholesale funding is of special importance for observing how banks' funding costs develop, and often used as a proxy for overall costs. The wholesale

funding costs were examined in two different platforms for this study: Five-year senior CDS spreads were used for examining DNB's situation against its Nordic peers who are to meet milder requirements due to lack of transitional floor and Pillar 2 add-ons, whereas five-year senior unsecured bond spreads to three-month NIBOR were employed to study how costs developed for Norwegian banks of different sizes.

The CDS premiums have shown that, DNB's spreads were very alike with the spreads of other Nordic groups operating in Norway who do not have to meet such strict capital requirements. As it was highlighted previously this was noteworthy for observing that investors did not have a particular negative approach towards DNB, who is subject to uneven regulations and needs to establish larger buffers. Likewise, the bond spread analysis has demonstrated that the systemically important banks (DNB and Nordea Norge) did not lose their advantageous position to raise cheaper funding at the wholesale markets even though they are required to meet stricter capital regulations.

It was mentioned earlier that the CDSs and bond spreads were heightened as a result of extreme situations during The Subprime Crisis (2008-2009) and European Debt Crisis (2010-2012), however there are also other minor fluctuations that need clarification. Firstly, it catches the eye that the banks enjoyed a low-cost era between 2013-2015, which was the period that Basel III was incorporated into Norwegian law through CRD/CRR IV and banks were to build large amounts of capital. Considering the overlap, one could think that as some scholars (e.g. Agur, 2013; Babihuga & Spaltro, 2014) assert, the wholesale debtors may have reduced the premiums due to internalization of risks by banks through better capitalization. While this notion is reasonable, this short period of cheap financing from the markets is not enough to support these discussions within the scope of this work. Furthermore, according to Norges Bank (2015a) this low-cost era was a result of growth in the economy due to high oil prices and substantial investment in Norwegian continental shelf.

However, this cheap funding period did not last long and as of second half of 2015, wholesale costs have started to rise which is mirrored both in CDSs and bond spreads at varying levels. This movement is debated to be deriving heavily from the drastically reduced oil prices, weakening the growth prospects for Norwegian economy (Norges Bank, 2015a), which is independent from the equity buffer regulations including the new CCyB requirement effective as of 1 July 2016.

Based on these discussions, it can be debated that the market funding costs of DNB and other Norwegian banks of small and medium sizes did not show any peculiar co-movement with the gradually increasing equity share in the funding in the examined period of 2008-2015, and the costs seem to be primarily a function of macroeconomic climate for the given period.

But how come the market did not respond to the substantially heightened equity buffers of the banks, especially to DNB's extra burden to build capital? The most probable rationale for that is the banks' choice of method for building capital cushions. Considering that conforming to the Pecking Order Hypothesis the banks chose to build capital mostly through earnings retention in a moderate way, which was particularly suitable for Norwegian context given the high profitability (Aronsen et al., 2014), they did not give the feared 'negative signal' to the markets that is associated with issuing equity.

This smooth transition to higher capital levels is also in line with discussions of Kashyap et al. (2010) who advocates that the costs associated with obtaining capital can be eliminated by earnings retention as previously mentioned. Also, the role of finance authorities in Norway is to be stressed. As it was suggested by Kashyap et al. (2010) and Vale (2011) the successful phasing of the regulations with room for earnings retention may have contributed to the banks' catching up with the increased requirements.

There is, however, one matter that raises concern. It is observed that while banks had access to cheaper funding before the sub-prime crisis through very low spreads to NIBOR (as low as 2 bps for DNB²³), even though there were periods that spreads were lowered, it has never gone back to the pre-crisis levels. Whereas this is a very broad issue that can have many possible answers, Cummings and Wright (2016) highlight the role of reduced investor confidence since the subprime crisis and debate that the heightened costs are a legacy of 2007-2008 turmoil rather than the impact of increased equity in funding mix. Nevertheless, considering the Basel III and stringent CET1 regulations are products of the subprime crisis, this behavior needs to be investigated deeper.

²³ Based on information gained from DNB Markets.

7.1.3 Cost of equity

The equity costs have fallen for the chosen sample of banks since 2010, showing a harmony with the increased share of equity in funding, which is in line with MM Theory's main arguments: as equity funding increases, the volatility of equity decreases, and so does the cost of it (Aronsen et al., 2014). This decreasing tendency is also in accordance with the MM discussions on falling ROE of large IRB banks due to lowered risk since as the banks get more profitable the cost of equity increases when computed by inverse of PE ratio (King, 2009).

All in all, the investigation of different sources of funding has captured both contradicting (e.g. increased deposit costs) and conforming (e.g. decreased cost of equity) results to the previously presented MM discussions. It is not possible to determine to what extent the regulations influenced the costs given the descriptive nature of this work. However, it is of importance that the costs did not show any particular adverse movement that could be directly linked to the increased capital regulations, and the large movements of costs could primarily be explained by other macro conditions. Furthermore, presented theories emphasized heavily that the increased funding costs are to be reflected in the lending spreads (e.g. Slovik & Cournéde, 2011). As it will be examined deeper under cost of intermediation, while the recent widening in the spreads gained pace and reached a peak in 2013, the costs were in a decreasing period and remained low as high spreads persisted, particularly during 2014-2015. Hence, it can be argued that in the period following the incorporation of Basel III in Norway, there was no *extensive* hostile pattern in the costs that the regulations can be solely blamed for, which is also supported by the movement of spreads. This attitude is in line with work of Vale (2011), who predicted minor changes in the lending spreads of Norwegian banks even if the regulatory capital was doubled.

7.2 Earnings retention and bank profitability

The analyses have shown that, in line with Pecking Order Hypothesis and Kashyap et al.'s (2010) corresponding discussions, banks in Norway preferred to build capital by earnings retention. As explained by former research, retaining earnings is deeply connected to ROE and cost of intermediation (i.e. lending margins) as it puts pressure on both. The relationship between these vital gauges is crucial in the Norwegian context since the analyses have revealed an obvious widening in the margins since 2012 as predicted by presented former work in the field.

Many scholars presented in the literature review predicted a fall in the ROE levels following the stricter capital regulations (e.g. Ackermann, 2010; Admati et al., 2013, Allen et al., 2012). When the ROE of Norwegian banks for the last ten years is examined, it is observed that while the average ROE did not experience a significant fall after stricter regulations but was more stabilized, the large IRB banks included in the sample faced a sharp decline. Hence, whereas the average ROE levels do not conform to the findings of Härle et al. (2010), who asserted a decline of at least four percentage points for European banks' ROE due to capital regulations, the large IRB banks exceed this prediction.

It is of interest how Norwegian banks on average managed to perform so well during and after the crisis in the means of ROE. Considering the aforementioned discussions of King (2010) and Chun et al. (2012), one could wonder if the recent widening in the spreads aimed to support the ROE which is under pressure of capital assembling through earnings retention. This discussion may be legit for economies struggling with ROE, but it may be invalid for Norwegian banks. More importantly, the expanding of the lending spreads is much higher than what the former academic work predicts for the purpose of supporting the ROE. While the former research asserts a widening of 9bps to 15bps for supporting ROE (Chun et al., 2012; King, 2010), it is observed that the lending margins have widened by 142bps from 2011Q2 to 2013Q2²⁴, which still endure even though eased slightly. Hence, whereas the increased earnings through heightened margins obviously had a positive impact on ROE, asserting that banks widened their margins *mainly* to support ROE would be an overstatement, since there was no sign of lowered overall profitability in the investigated period and the average ROE was stable in spite of the increased earnings, implying that improved earnings were utilized for some other motivation (e.g. meeting CET1 requirements). Yet, it is still curious what made Norwegian banks so robust during and after the crisis. According to Finanstilsynet (2011, 2013c, 2016b) the most important factors keeping the ROE at high levels are the minimal loan losses and effective cost management when compared to other economies.

On the other hand, it catches the eye that large banks have suffered sharp decreases in their ROE since the crisis. This behavior is in accordance with the previously introduced discussions of Elliott et al. (2012) and Bohme et al. (2011) asserting that the new risk coverage section of

²⁴ As illustrated in Figure 20.

capital regulations and limitations on OTC derivatives would substantially lower the ROE for large banks. Even though the average ROE in Norway did not encounter a sharp decline, the reduction in large banks' returns is still of importance from the viewpoint of investors. The question of how do investors perceive lower returns has become a debate field succeeding the new regulations. Admati et al. (2013) addresses with an MM Theory insight that the more equity financing will lower the risk, and hence the returns, which the investors will tolerate. On the other hand, Aronsen et al. (2014) point out that in case of a no or partial MM effect, the investors would require higher returns. In consideration of aforementioned discussions asserting that such development would make banking industry unattractive for investors when compared to alternatives (e.g. Ackermann, 2010), this issue bears dire importance. However, looking at the matter in Norwegian context where the ROE levels are still higher than its European peers, worries regarding the investor appetite are less relevant for now.

7.3 Cost of intermediation and repercussions

7.3.1 Lending spreads

The theories presented previously suggested a widening in the spreads and therefore, passing the burden of capital regulations to society (e.g. Hanson et al., 2011). The examining of the lending spreads in Norway did reveal such trend following the Basel III proposals. As it was illustrated in the analysis the average lending spread started to enlarge in 2012 and peaked in 2013Q2. While the margins eased slightly in 2015, they still did not go back to the relatively low levels of 180-200bps back in 2010-2011.

Why were the spreads widened? One of the potential explanations is that three-month money market rate in Norway started to decrease in late 2012, in accordance with the lowered key policy rate, which put pressure on the lending margins (Norges Bank, 2012). While this is a very legit explanation for broadened margins, it does not shed light on why the widened spreads have persisted so long. Considering that the market funding costs were lowered in the period the margins were increasing, this behavior suggests that the banks were trying to boost the earnings and build capital in the recent years as Roger and Vlcek (2011) predicted. Indeed, Norges Bank (2012; 2013) backs this notion up by pointing out that normally as funding costs fall, the margins would have gone lower as a result of intensified competition, and hence, the overall margin increase in Norway in a time of lowered funding costs reflect the intention of boosting the earnings for building capital cushions. This argument is more apparent when the

changes in CET1 ratio of IRB banks by earnings retention²⁵ and lending spreads are examined. As spreads start enlarging by 2012, the contribution of earnings retention to CET1 levels increase as well. Eventually, following 2013 where the spreads peak, the whole contribution to CET1 capital in 2014 comes from the earnings, implying the *main* reason why the spreads were elevated. While the margins can also be enlarged to support the ROE (see Ackermann, 2010; Chun et al., 2012; King, 2010), given the high profitability of Norwegian banks through the years it does not seem as the major concern as discussed previously. As the lending spreads were widened significantly -which is to increase the earnings and therefore the return- ROE remained stable, hinting that boosting ROE was not the *primary* motivation.

When it comes to how different borrower types were affected from the change in margins, the numbers revealed that on average the households (personal loans) were subject to higher lending followed by non-financial corporations and mortgages. This tendency seems to contradict with the findings of Bridges et al. (2014) and Noss and Toffano (2014) who demonstrated that banks apply higher rates to corporate loans in order to boost the earnings for meeting the capital requirements. However, since their household segment includes also secured household lending (i.e. mortgages), and does not differentiate for unsecured personal loans, the difference in the results is natural.

The lending spreads of SIFIs were of special attention given the higher CET1 capital regulations they are subject to. As it was presented previously, this regulation raised concerns due to imperfect competition in the markets, and it was predicted that the intensified competition will lead to higher margins by systemically important banks (Drumond & Jorge, 2013). Due to confidentiality, it was not possible to reach all lending spreads to make a thorough comparison between SIFIs and smaller banks, therefore spreads of DNB, Sparebank 1 SR Bank and the average of Norway were investigated to get an overall picture.

DNB's position is of importance from many aspects. While DNB is to meet higher requirements together with Nordea Norge as part of SIFI regulation, it is also subject to an additional Pillar 2 requirement of 1.5% with regards to the bank-specific risk it carries. Furthermore, since DNB is a Norwegian IRB bank, it is subject to transitional Basel I floor, which means that it needs to gather more capital to meet the ratios than foreign branches (such as Nordea Norge) as

²⁵ See Figure 14.

explained previously. The numbers have revealed that while the average margins of DNB increased in line with the rest of the financial institutions, they still were lower than the average of the economy. In 2013Q2 where margins peaked by 310bps, DNB's average margin was 232bps. Seeing the extra burden DNB is to carry due to uneven capital regulations, it is interesting how they kept their position. A potential answer to that is the highly concentrated structure of Norwegian banking sector where DNB holds about 1/3 of the loans market since it is argued that banks with large market share can apply economy of scales and offer spreads lower about 30-60bps than average (Čihák, 2004). Of course, there are still banks offering cheaper loans on average (e.g. Sparebank 1 SR-Bank), however owning the majority of loans market gives certain advantages for not cutting rates much. Čihák (2004) explains that while banks can employ economies of scale to offer cheaper lending than the average, there are also arguments stressing that they can still keep their spreads up at a reasonable level using their market power.

When it comes to different borrower types, the discussions of Bridges et al. (2014) and Noss and Toffano (2014) are more clearly reflected in DNB's more detailed lending spreads documentation. The lending margins of DNB illustrates that while SMEs suffered the most during the high-margin period, they were followed by personal customers, large international corporations and mortgages. While the margin applied on SMEs was 233bps in 2012Q1, it raised to 279bps in 2013Q4. On the other hand, even though they faced smaller margins, personal customers experienced a larger change; the lending spreads elevated from 159bps in 2012Q1 to 252bps in 2013Q3, reflecting a change of almost one percentage point. Considering the previously stressed household indebtedness problem of Norway, the increased margins for unsecured household loans can be reasoned with. Nonetheless, the approach towards SMEs raises concern, since they are the backbone of healthy economic growth (Lind, 2005). The higher risk weights assigned to SMEs with respect to their higher probability of defaulting on loans make sense within the logic of bank regulation. But there are also alternative studies indicating that SMEs are less risky than what capital regulations assign such as the work of Düllmann and Koziol (2013) focusing on reduction in systemic risk rather than idiosyncratic risk. With regards to the vital place of SMEs within the economy, particularly during slow-down periods such as Norway is experiencing now, these counter arguments should be taken into consideration.

7.3.2 Loan growth

As a natural outcome of the increased spreads, the lending was reduced particularly for non-financial corporations as twelve-month credit growth²⁶ numbers have revealed, while household loans were more stable due to the increasing share of mortgages within loans granted to households.

Seeing that the main motive of regulatory capital buffers, particularly of the CCyB, is to avoid excessive credit growth during good times and build cushions to absorb losses in bad times, the reduction in lending growth may be considered as well-adjusted. Accordingly, Berger et al. (1995) stresses that the more expensive lending and the following decrease in loan growth is a tradeoff for increased solvency and reduced probability of systemic risk. However, the behavior characterized by increasing the mortgage lending at the expense of corporate lending, which is observed in Norwegian banks' strategies for meeting the requirements (Norges Bank, 2012), is problematic.

It is of interest how non-financial corporations coped with the reduced lending. The chart below illustrates how the non-financial corporations financed themselves during the period of high lending spreads.

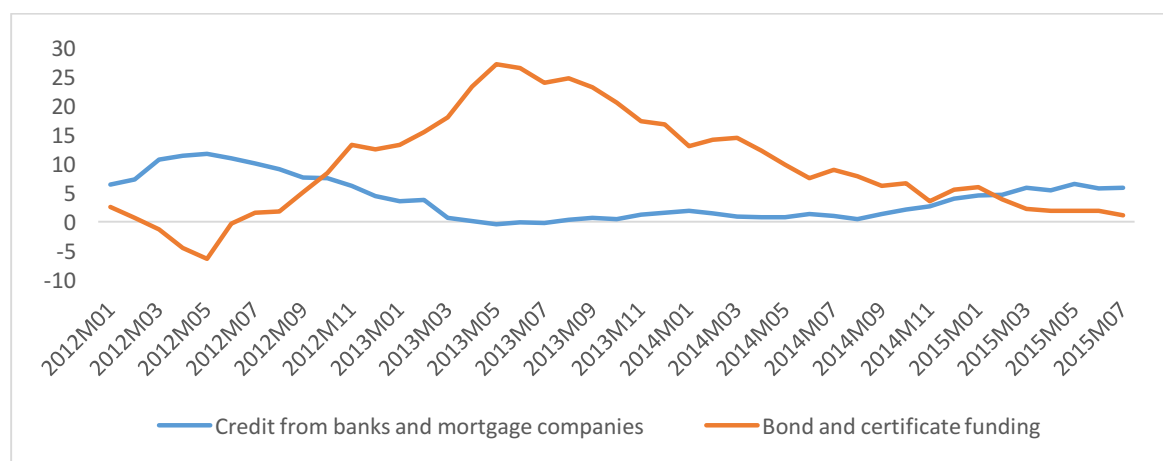


Figure 30. Credit to Norwegian non-financial enterprises. Twelve-month growth. Percentage points. Adapted from FNO (2015).

It is demonstrated in Figure 30 that the non-financial corporates raised funds mostly by issuing bonds and certificates during the period lending spreads peaked and corporate lending was

²⁶ Credit indicator C2.

reduced. While this development is important for maintaining economic activity, it should be kept in mind that only large corporations have the possibility to raise funds by issuing bond as FNO (2015) highlights. Hence, this may be indicating that while resourceful corporations weathered the loan-squeeze by issuing securities, SMEs were in a more difficult position. Correspondingly, the previously mentioned shortcoming of Basel II regarding the SMEs can be still valid within Norwegian framework under Basel III implementation.

Another major worry with the trend in lending growth is the increasing share of mortgages within the household loans which is observed in Norwegian banks' lending behavior. Seeing that *secured* mortgage lending is less risky for banks even when regulations are not taken into consideration, capital regulations are not solely responsible for this tendency as Allen et al. (2012) points out. However, banks have a clear incentive for granting mortgages also within the regulatory framework given the low risk weights. Hence, this attitude can potentially be examined as a balance sheet adjustment practice, which is characterized by limiting the loan for riskier groups such as SMEs, while focusing more on mortgages in order to satisfy the capital ratios (see Babihuga & Spaltro, 2014).

Such behavior poses a great threat for Norwegian economy from different aspects. As it was previously emphasized based on IMF's (2015b) thorough examination, Norwegian households have very high indebtedness level, and the debt-to-disposable income ratio is among the highest in the world; furthermore, as banks keep issuing more mortgages, the house prices keep climbing accelerating the housing market bubble in Norway, where the houses are estimated to be highly overpriced. This development exposes the banks to credit risk in case of a sharp price decline in the housing market (i.e. a bubble burst), given the high household indebtedness (see IMF, 2015b). Thus, while banks are reducing their risks on paper by granting "low-risk, secured loans" such as the mortgages, they contribute to the systemic risk growing in practice (Winje & Turtveit, 2014). This dilemma was attempted to be addressed by the authorities by the introduction of Basel I Floor, which increases the weight of mortgages for IRB banks since their risk-weight were as low as 9.4% to 13.2%²⁷. However, as previously explained this led to further complications through foreign banks operating in Norway.

²⁷ See Figure 10.

Finally, many research predicted a permanent or long-term GDP slowdown as an outcome of the widened spreads and the corresponding, lowered loan growth (e.g. MAG, 2010; BCBS; 2010, Miles et al., 2011). When the GDP of Norway was investigated following the introduction of Basel III in Norway through CRD IV, it catches the eye that the GDP growth slowed down in 2013, which is the period where the spreads culminated. However, this behavior does not necessarily validate the former research in the Norwegian context. First of all, while the studies presented anticipated the GDP growth to diminish up to nine years or permanent, as of 2014 the GDP of Norway gained pace again. Furthermore, when the financial disclosures of 2013 are investigated it is observed that the slowdown of GDP growth was mainly due to the reductions in petroleum industry and overseas shipping, which fell down by 3.5% in the given period (e.g. Finanstilsynet, 2013b; 2014b).

7.3.3 Competition

The matter of competition is of special importance for Norwegian banking, both due to SIFI regulation and asymmetrical Basel I Floor application. It was previously discussed that DNB, who needs to gather more capital than any bank operating in Norway, did not have to substantially widen its spreads when compared to the average. However, while this behavior gives a general picture of how DNB is positioned against rivals, it does not give an actual picture of how competition has changed in the recent years.

The market share developments since 2010 have shown that DNB lost a minor stake both in corporate and retail markets. Based on the scope of this practical study, it is not possible to estimate to what extent that loss was due to DNB's extra regulatory capital burden. However, this trend is worth a close examining in the coming years in light of the regulations.

On the other hand, the advancement of foreign banks' loan growth against domestic banks' has more basis to be linked to asymmetrical regulations as Grimsby et al. (2016) points out. The analysis has demonstrated that the foreign branches' growth started to exceed Norwegian banks' growth both in retail and corporate markets. This trend can be an outcome of various market actors, nevertheless, it attracts attention that this act gains pace in 2014, following the new risk weight calibration of Norwegian IRB model banks.

Table 10. *Average mortgage loans risk weights of a sample of banks. 2012-2015.*

	2012	2013	2014	2015
DNB	11,7%	10,0%	17,0%	23,0%
Danske Bank	14,0%	13,0%	15,0%	14,0%
Handelsbanken	9,6%	8,8%	11,6%	12,0%
Nordea	9,0%	8,0%	11,0%	12,2%

Source: Banks' pillar 3 reports.

Table 11. *Average corporate loans risk weight of a sample of banks. 2012-2015.*

	2012	2013	2014	2015
DNB	50,2%	46,0%	43,0%	46,0%
Danske Bank	36,0%	43,0%	39,0%	39,0%
Handelsbanken	37,3%	36,3%	31,6%	28,1%
Nordea	57,0%	56,0%	43,0%	46,0%

Source: Banks' pillar 3 reports.

As illustrated more detailed in Table 10, while the largest Norwegian IRB bank, DNB, experiences a significant increase in the risk weight for mortgages in 2014, the other Nordic groups such as Danske Bank, Handelsbanken and Nordea deploy lower risk weights due to regulative differences, and hence offer cheaper loans²⁸. Likewise, DNB is in a difficult position also in corporate market particularly against Danske Bank and Handelsbanken as illustrated in Table 11. Therefore, the developments in the loans market can be examined within the aforementioned "leakage" discussions of Bridges et al., (2014), asserting that foreign banks can step-up with new lending as a result of uneven regulations at the expense of domestic banks.

One could wonder what is wrong with foreign banks gaining market power through regulatory leakage as long as they contribute to the economy by cheaper lending. In the Norwegian context, the most relevant challenge deriving from the foreign branches' increasing presence in the loan market is the housing bubble problem. It is debated that while Norwegian IRB banks' regulations are tightened to address the increasing housing prices due to high demand, Nordic banks are still offering cheaper loans due to their lower risk weights which makes the recent revision in Norwegian IRB model banks' mortgage risk weights useless (Grimsby et al., 2016). Accordingly, this tendency also affects the previously highlighted high household indebtedness in Norway adversely.

²⁸ While the high risk loans require more capital per loan, low risk loans require less within the Basel regulation as explained previously. Hence, assigning smaller risk weights gives more room for lending.

In addition, the growth of foreign banks in the economy results in further problems such as the potential *flight home effect* which is stressed by Grimsby et al. (2016) for latest developments in Norwegian loan market. This argument asserts that the foreign banks squeeze lending in other economies and carry their business back to their home country in order to get advantage of bail-in regulations there in case of a crisis, while amplifying the turmoil in foreign economies through credit crunch (Berlin, 2015; Grimsby et al., 2016).

Hence, many argue that this unevenness in the rules does not help the situation at all other than making domestic banks to lose competitive power. But how to address this problem? Grimsby et al. (2016) and Skjæveland et al. (2015) suggest that Basel I Floor needs to be removed and regulations should be leveled with the EU. On the other hand, as an alternative solution, Norges Bank (2015a) states that an efficiently high leverage ratio regulation could replace the transitional Basel I Floor.

7.4 What can the future bring?

7.4.1 Potential updates on regulations

When the outlook is examined for Norway, there are interesting aspects. Looking at the nearer future, it is argued that in recognition of the slowdown the economy is going through, the authorities can raise the CCyB to its full capacity of 2.5%, in the third or fourth quarter of 2016 (DNB, 2016a). In such case, whereas the minimum CET1 requirement for Nordea Norway increases to 14.5%, DNB would have to satisfy a CET1 ratio of 16.0% including the Pillar 2 add-on buffer.

Concerning the Basel I Floor regulation in Norway which is highly recommended to be removed since it is causing competitive imbalances between domestic and foreign banks (see Grimsby et al., 2016; Skjæveland et al., 2015) there seems to be no official statement of update yet. In a recent speech, the finance minister Jensen (2016) points out that different interpretations of Basel I Floor puts Norwegian banks, particularly DNB, in an uncompetitive position against their Nordic peers, however further comments that this issue is to be attended by the BIS. This may translate into that Norwegian authorities will not remove the floor and adjust the system to EU regulations themselves. Accordingly, with regards to the stress building up on the housing market due to the leakage in regulations Jensen states that given the vulnerability of housing market, this issue is to be addressed very cautiously without

introducing big changes (The Local, 2015). Hence, Basel I Floor is not expected to be removed in the nearer future. That being said, how the loan market and competition will develop in Norway in the years to come concerning the -even though slightly- decreasing share of DNB is a curious question.

7.4.2 Outlook in Norway

As it was illustrated previously, Norwegian banks do not have substantial problems with living up to the requirements given their profitability and hence availability for earnings retention. However, it is of interest for how long Norwegian banks can keep building capital *primarily* by earnings retention without running into trouble. This issue bears dire importance as Norwegian banks need to gather a total additional capital of 31bn NOK as from 30 June 2016 for a RWA growth of 2.5%, without further updates to CCyB²⁹.

Indeed, Finanstilsynet (2016b) warns that with the economic growth slowing down since low oil prices endure, as of 2016 banks already are facing increased loan losses when compared to previous years, which exposes Norwegian banks to credit risk. This issue is of paramount importance, since it is tiresome for banks to retain earnings in such downturns due to reduced earnings, which may result in utterly limited lending (Shim, 2013). Hence, if banks' profitability goes into a declining phase, due to the pressure placed by cushion building, lending spreads can be widened even more and persist for some time. While this may end up in accelerated balance sheet repairing practices by giving more focus on mortgages, it may hurt the corporate loans with a sharper decline than it is experienced now. Furthermore, there are concerns over the banks' future wholesale funding costs in USD considering the weak prospects for the economy due to the low oil prices (Norges Bank, 2015a), which may place more tension on the lending spreads. An adverse scenario like this could turn the capital requirements into a pro-cyclical tool and further amplify the recession until the CCyB is released if necessary. Therefore, given the unpleasant outcome, banks may consider external equity raising as they did back in 2009.

When the issue is examined from a more positive perspective where the loan losses do not increase extensively, or the bank funding costs do not climb substantially, it can be stated that the current widened spreads are expected to persist given the need of constant buffer

²⁹ See Table 9.

maintenance through earnings. As aforementioned, the more expensive lending can be interpreted as a tradeoff for more solvent system (Berger et al., 1995). Nevertheless, without addressing the previously explained weaknesses, the systemic risk building up on these points will keep growing into the future.

7.4.3 Future of Basel framework

The new Basel regulations have changed the banking game enormously with the greater focus placed on asset management and safe funding (Allen et al., 2012). As such, its repercussions will not be limited with the current transition phase, but will also shape the banking's future.

While the banks are still trying to adjust themselves to the new focus on bank capital and risk weights, a new wave of regulations are expected for addressing the current weaknesses. The issue of "proportionality" is one of the prominent areas where the debates gather. It is reported that smaller banks in the EU area are exposed to a disproportionate burden through regulations when compared to the US peers (Alexander, 2016). According to this notion, the small European banks which are not systemically important, and some business models with lower risk profile are justified for a lower regulatory burden, particularly when it comes to reporting of risk which requires highly skilled techniques and staff (Alexander, 2016).

Correspondingly, BaFin (2013) stresses the importance of nature, scale and complexity of banks and their activities, which requires "proportionality principle" not just based on size (e.g. SIFI vs non-SIFI or IRB vs standard method bank) but also on business model and individual risks which requires case-by-case approach.

However, while all these arguments mean more in-depth regulations, there are also critics directed at the complex nature of buffers and risk weighting methods for different loans. As they were presented very basic in the earlier chapters, the Basel Frameworks have expanded their scopes and become more complicated through each version. That being said, it is discussed that the regulations are becoming too complex for bankers to address them through full understanding and also that they are taking attention from the banks' core business (Isachsen, 2016). With respect to these worries, there are already opinions based on the dropping of highly complicated procedures and regulating capital solely by what percentage equity capital banks have (Ford, 2015). One of the most prominent advocates of this view is American economist

Alan Greenspan who asserts “fewer rules and higher capital ratios would save everyone a lot of bother”, and further discusses that a capital ratio of 20% or 30% would just sort things (Ford, 2015; Isachsen, 2016).

Whereas all these discussions put pressure on the regulators to some extent, how it will result is unknown. According to Noonan (2016) from Financial Times, Basel IV is already on the way with even more complicated procedures on calculation of RWAs and operational risk, however this information is not confirmed by the regulators yet. Considering that the Basel III implementation phase is at work until 2019, whether the highlighted issues of proportionality or complexity will be addressed is ambiguous.

Chapter 8: Concluding remarks

8.1 Conclusion

This study was set out to discuss how the more stringent capital regulations of Basel III have affected the important aspects of Norwegian financial industry in the light of the former research. Considering that Norwegian banks have chosen to establish capital buffers mainly by earnings retention, most of the discussions were built upon this aspect of gathering capital. Although the documented trends do not necessarily validate the former research for Norway, they give great insight about the future and critical issues that need further investigation.

When the bank funding costs were examined for the period after the crisis, it was revealed that costs of different sources of funds behaved divergent. Even though this work cannot determine to what extent the regulations have increased the costs, it can be stated that any large movement in the costs could be explained primarily by other macro factors. Furthermore, even if there was an *extensive* increase in the costs due to regulations which was not captured by the discussions, it was not reflected in the lending spreads contrary to what the former research predicted – the spreads increased while costs were decreasing.

Examination of the costs for the banks of different sizes demonstrated similar results, where the SIFIs maintained their position for cheaper funding than other banks in spite of more stringent regulations. Moreover, DNB who is subject to Basel I Floor, SIFI regulations and Pillar 2 add-ons did not face increased premiums for raising funds in the markets, indicating that investors did not shift their approach towards the bank given the extra burden of it deriving from uneven regulations.

The profitability of the banks was one of the major interests of this study due to its relationship with earnings retention and buffer establishing. The descriptive picture in Norway demonstrated that while the average ROE did not reduce as presented theories asserted, the larger IRB banks experienced sharp decreases in returns which may be examined within Basel III's restriction on derivative products. Regarding the arguments asserting that banks widen their spreads to support their falling ROE; even though the increased earnings are to have positive impacts on returns, given the emphasized stable high profitability of banks for a long time now and the scope of the enlargement in the margins, this notion was found to be *inferior* to boosting earnings for building cushions.

Subsequently, Norwegian banks' cost of intermediation was investigated. This dimension of financial sector was of particular importance since the theories presented asserted that the effects of regulation on costs, profitability and buffer establishment are to be reflected through lending spreads. It was illustrated that the cost of intermediation in Norway has increased starting from 2012 while funding costs were in a decreasing phase. Such behavior suggested that banks were boosting earnings to build buffers. This notion was further supported by the fact that IRB banks utilized earnings up to 100% in order to establish CET1 buffers in the recent years, proposing that even though higher earnings from loans contributed to the ROE, the *primary* reason for enlarging margins was to support buffers. Moreover, when the recent lending practices were examined more in detail, traces of balance sheet adjustment and regulatory leakage were captured which require further attention.

In conclusion, this discussion-based investigation of Norwegian banking industry in light of the regulatory capital theories has revealed that the important measures of bank industry behaved both within and outside of the former research, where the increased cost of intermediation is found to be the most relevant result of regulations. As highlighted previously, this development is debated to be a trade-off for eliminating systemic risk through avoiding excess credit growth (Berger et al., 1995). Nonetheless, the stress building up on different points of the structure due to imbalances in regulations -such as amplified mortgage lending and imbalanced competition- raises concerns for the future.

8.2 Limitations and further research

This study had certain limitations. To begin with, this work was of descriptive nature. Hence, the conclusions drawn do not have the ability to be asserted in a mathematical certainty as an empirical study would have.

The analysis investigated a wide array of financial indicators based on regulatory capital regulations. Nevertheless, Basel III does not consist only of capital regulations. There are also features of liquidity and leverage, which may have influences on the areas of investigation. Likewise, there may be contributions from various market factors other than regulatory capital in the movements of examined indicators. While these were addressed as much as possible given the scope of descriptive methodology, more in depth studies should be conducted to determine each variable's precise role in the trends. Furthermore, seeing that the results presented were retrieved heavily from average numbers for Norway and were not studied case-by-case, the arguments provided give a general picture, but do not apply to each and every bank operating in Norway.

Apart from the stressed potential impacts of various regulations, considering the imbalances in the finance industry deriving from uneven regulations, more research should be carried out on alternatives to Basel I Floor. Considering that the suggestions focus mostly on leveling the decrees with the EU or introducing a more efficient leverage ratio, scenario studies revealing how the competition and loans granted are influenced by different proposals could be an idea for future research. Alternatively, more in-depth studies on why the funding costs have not recovered to the pre-crisis levels apart from the damaged investor confidence can be a promising field for investigation.

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