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Basel III - Financial stability at the Expense of innovation and economic growth?

An Analysis of the Possible Effects Basel III have on Access to Funding for Small and Medium Sized Enterprises, Entrepreneurs and Economic Growth.

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Abstract

This thesis investigates the impact of introducing the Basel III banking regulations. Specifically how it affects access to funding for innovative SMEs and entrepreneurs. Access to funding for these enterprises is vulnerable, thus an interesting question is whether Basel III improves or deteriorates the situation.

The financial crisis had a major negative impact on the world economies and caused permanent losses, both contributing to a downward revision of prospects for economic growth. SMEs and entrepreneurs are key participants in improving economic growth, hence the question of how Basel III affect economic growth through possible changes in access to funding for SMEs and entrepreneurs is also addressed in this thesis.

Both empirical studies and the discussions in this thesis find evidence of Basel III affecting access to funding for SMEs and entrepreneurs in a negative way. It causes reduced lending and increased credit risk premiums, affecting SMEs and entrepreneurs to a greater extent than larger firms. However, findings suggest that the country-to-country differences will diverge. I also find that SMEs and entrepreneurs' access to funding is dependent on the economic environment. Thus, a stable economy, which is the objective of Basel III, in the long term, may ease the access to bank lending. This effect also applies to alternative funding such as venture capital. Both bank lending and venture capitalists are procyclical in supply of credit, hence less fluctuation in the economy result in a reduction in volatility of the supply of credit to SMEs and entrepreneurs.

Based on these findings the impact on economic growth seems to be divided. The findings implies a slowdown in economic growth in the short term, while future prospects will increase because stability in the economy reduce probability of a costly crisis and ease the access to funding.

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Preface

This thesis is written as the ending contribution to my Master's degree in Economics and Business Administration at the Norwegian School of Economics (NHH). The thesis amounts to 30 credits, which corresponds to one semester of full-time studies.

The choice of topic for this thesis has been impacted by my interest for economic development, and the controversy amongst economists related to the new Basel III regulations that were implemented January 1, 2013. Another factor was an experience from my exchange to American University in Washington DC during the spring semester 2014. As part of the exchange, I listened in on a Congressional hearing on the increasing scope of banking regulations and the repercussions they entail, which altered my initial, and exclusively positive, view on banking regulations. In addition, today's focus on innovation as one of the main sources for efficiency of enterprises and development of new markets aroused my interest in how innovative SMEs and entrepreneurs will be affected by the new banking regulations.

The thesis constitutes theory, empiricism and discussions on how Basel III regulations affect banks' behavior; implications for innovative SMEs and entrepreneurs; and effects on economic growth. As of today, there is research and literature addressing both implications of Basel III on SMEs and economic growth, but little directly targeting or including effects on innovation. Due to the importance of innovation, I hope that this thesis can contribute to the literature by awakening interest in the advancement of research on these specific relationships.

Working on this thesis has been both challenging and rewarding. There have been times when frustration challenged my patience, but I have definitely learned a lot and gained insight into many important issues.

Finally, I would like to give a special thanks to my thesis advisor Eirik Gaard Kristiansen, professor at the Department of Economics at NHH, for guidance, comments, valuable discussions and input throughout the working process. I would also like to thank friends and family for feedback, comments and proofreading.

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Lene Jul-Larsen

1. Presenting the Issue

This paper seeks to discuss and analyze the effects banking regulations have on access to external funding, specifically bank lending, for small- and medium-sized enterprises (SMEs) as well as entrepreneurs. SMEs and entrepreneurs play an important role in economic growth though innovation and job creation, which raises questions about how the new regulations will affect economic growth. The main question I focus on is:

1. How will Basel III regulations affect SMEs and entrepreneurs' access to funding?

In addition, I will pay some attention to the question:

2. How will possible changes in access to SME and entrepreneur financing affect the prospect for economic growth?

In order to analyze the issues described above, it is important to consider the following questions:

- What is Basel III and what implications does it have on bank lending?
- What are SMEs and entrepreneurs?
- What is the capital structure of innovative SMEs?
- Which sources of funding do SMEs and entrepreneurs have access to?
- How will the overall impacts of Basel III on bank lending affect SMEs and entrepreneurs' access to funding?
- How will these changes effect expected economic growth?

1.1 Thesis Outline

This paper is structured in the same way as the questions presented above. Section2 gives an overview of the financial crisis leading to a change in international banking regulations, as well as the importance of SMEs and entrepreneurs for economic growth. Section 3 presents the background of the Basel Committee on Banking Supervision (BCBS) and an overview and explanation of the Basel regulations. Section 4 explains how banks may react and adapt to Basel III. Section 5 attends to SMEs and entrepreneurs' capital structure and funding options. Section 6 constitutes a discussion of the possible effects of the Basel III regulation on SMEs and entrepreneurs' access to funding and thereby economic growth. In addition, it presents an overview of recent developments and the current situation of SME funding as well as the world economy. Section 7 sums up the major findings and conclusions from the analysis. Sections 3-5 is meant to give a theoretical and empirical background for the analysis made in Section 6.

Sections 3-5 are hence more general discussions of the issues presented before. Section 6 will combine the discussions and conclusions from the previous sections, and apply them to the direct effects related to SMEs and entrepreneurs.

1.2 Refinements and Assumptions

The paper will focus on the SMEs and entrepreneurs with focus on innovation and with growth potential. Due to the fact that both the long-term effects of the financial- and debt crisis are not yet known, and that the Basel III regulation still is not in full action until 2019 (Basel Committe on banking supervision, 2011), it is impossible to analyze or conclude anything about the real direct impact on SMEs, entrepreneurs and economic growth. This paper will therefore be a theoretical and empirical analysis of the effects one can expect to see in bank lending to SMEs and entrepreneurs, and growth.

There is no assumingly ubiquitous result due to country-specific factors. The current economic situation differs from country to country. Although the financial crisis of 2007-2009 and the European sovereign debt crisis affected most economies to some extent, the pace of recovery has been different. In addition, financial infrastructure and sources of funding are not internationally uniform. A last concern about comparing effects across (country) borders is that Basel regulations are not required or implemented in all countries, and the regulations open for additional requirements at national discretion. Consequently, the economic base for the analysis will vary on a country-to-country basis. In addition, there are no common international benchmarks, which may result in variations in the scope of the impacts of Basel III. Thus, the paper will comment and recognize some of the country-to-country variations, but will not focus on the extent of the impacts for individual countries.

1.3 Literature

Because the material and research on this particular topic is relatively new, the majority of literature and references used are articles by organizations, researchers and economists. The authors' or the organizations' points of view may consequently affect statements and conclusions in some of the articles. I still consider the chosen articles to be valid sources of information because they are published by respected organizations as well as economists in renowned economic journals. As a precaution, I have read them with a critical eye, and taken into account that the angle may have been directed by the authors' personal view and opinions.

2. Introduction and Background

In 2007, the financial crisis caused chaos in financial markets all over the world. In the aftermath of the crisis, many economies are still struggling to get back to pre-crisis economic levels and growth. It became evident that the international financial system was neither robust nor stable enough to handle a collapse in one (geographical) market.

The financial crisis started with a boom in US housing markets. The increasing house prices created easy access to credit with real estate as collateral. Subprime loans are usually blamed to be the source of the crisis and it might have been the triggering factor. However, in retrospect, subprime loans were not the sole cause of the 2007-2009 financial crisis.

Instability in the financial market was built up over time. Innovation in financial markets resulted in complex financial structures. The increased use of securitization; asset and mortgage backed securities; pooling of assets with misjudged risk rating; Special Purpose Vehicles (SPVs); and increased intra-financial investments created a chaotic web of financial transactions. It was no longer evident who carried the risk, which led to errors in risk-assessments. At the same time, the use of these instruments created an internal connection and co-dependency between financial institutions globally, causing large country-to-country transfer effects.

National authorities' measures to counter the development and scope of the crisis with standard monetary policy measures had little effect. The measures were based on the problem laying in credit risk, but despite the dramatic reduction in central bank interest rates, monetary policy had little impact on the market rates. The "credit crunch" that occurred, especially after the Lehman Brothers' bankruptcy in 2008, occurred due to liquidity- and counterparty risk. High leverage rates and lack of or decline in value of liquid assets resulted in difficulties in distinguishing those who were temporary illiquid and those who were insolvent, hence cash flows ceased.

The second attempt to restrain the effects of the crisis was a more unconventional approach to monetary policy: Quantitative Easing (QE). The QE is based on Keynesian theory, with the objective to secure adequate capital and liquidity, and to reduce expectations for long-term interest rates to increase spending and thereby stimulate economic growth.

Although the QE seemed to have an effect on interest rates and credit access, in combination with increased government spending, it was a costly process. As a result, several countries e.g.

the PIIGS[1] countries experienced a public debt crisis, which put an additional dampening effect on the recovery to a normal economic growth rate.

The span of the crisis was wide; hence, it was later referred to as the great recession. The government debt crisis also highlighted a potential problem with risk assessments of government bonds as assets and collateral. Pre-crisis regulations were based on perceptions that government securities and bonds were close to risk-free, which the crisis proved, that this is not always the case.

Some economists claim the current (at the time) banking regulations, Basel II, created incentives to seek out other financial instruments and solutions. Assuming utility-maximizing rational market participants and investors it might be so. Whereas others believe that the regulations were insufficient to capture the increased complexity and financial innovations, which led to excessive risk taking and lack of equity capital coverage for the increased risk.

Despite the dispute about leading causes for the crisis, and whether too extensive or inadequate regulations created the instability in the financial markets, the Basel Committee of Banking Supervision (BCBS) decided to introduce Basel III. The new regulations are based on an even more complex regulative framework than Basel II, an attempt to capture the increased risk and complexity of the financial innovations. The motivation is to secure robustness and resistance in the finance and banking sector in order to reduce the probability of financial distress and a new crisis (Bank for International Settlements, 2014, p. 4).

It would be reasonable to argue that the international regulations are born in the wake of a crisis, when the flaws of the current system and regulations become visible. The objective is to enhance the financial stability and improve the quality and extent of market supervision. As a secondary effect, the supervision seeks to minimize the probability of macroeconomic instability and an outbreak of a new crisis. Even though the intensions are reasonably good, the question is how this type of governance would effect the economy. The effects of banking regulations reach far beyond financial stability. In the aftermath of the most recent financial crisis, no one would argue about the importance of a stable, functioning financial system. However, the question is; what would be abandoned in favor of financial solidity? And what is the economic cost of a solid financial system?

[1] Portugal, Ireland, Italy, Greece and Spain. Especially Greece, who were at risk of having to settle bankruptcy.

2.1 SMEs and Economic Growth

In the aftermath of one of the most severe financial crisis since The Great Depression in 1929, which contracted the GDP in economies over the globe in 2007-2009, we still observe an uneven recovery in growth patterns. In addition, prospects of growth have been downgraded, and governments have extended the time horizon on expansionary monetary policy. The bounce back has not been as fast as predicted in the period immediately after the crisis, possibly due to the debt crisis in Europe (OECD, 2014, p. 27).

In compliance with Keynesian theory[2], increased spending as a countercyclical policy, will lead to a reduction in unemployment and secondary, economic growth. Increased spending, raises turnover in businesses, who then need more employees to accommodate the growth in demand. Increase in demand for labor puts an upward pressure on wages. In combination with an increased number of individuals with income, the demand is heightened even further. As for the labor market, increased demand puts an upward pressure on goods and asset prices. These effects are self-reinforcing and continue in an upward spiral. Thus, job growth is crucial to economic growth. Assuming SMEs are the businesses with highest potential for job creation, these companies are essential in providing economic growth potential.

There are several factors contributing to economic growth, and there might be discussions regarding which of the factors are the main driving forces. Based on objectives for monetary and fiscal policy, it would be fair to assume that production (Gross Domestic Product, GDP) and employment carries great weight.

In a congressional hearing of the impact of growing financial regulations, Alon Hillel-Touch's testimony focused on the impacts the regulations had for new and small businesses. He stated that approximately 90% of US firms employ up to 19 workers and referred to the ADP national employment report, which revealed that companies with less than 50 employees created more than double the jobs as large companies in the last month of 2013 (Hillel-Tuch, 2014, p. 7).

Additionally, a study by Angelkort and Stuwe (2011) finds that SMEs (with annual turnover of up to 500 million euros) make up 99% of all German companies, and employ more than 70 % of all workers in Germany (Angelkort & Stuwe, 2011, pp. 6-7).

The OECD Scoreboard (2014) states that SMEs and entrepreneurs are critical to ensure economic growth, being sustainable and inclusive (OECD, 2014, p. 1). Innovative SMEs and

[2] His theory is based on demand specific or cyclical unemployment (Keynes, 2008 (1936))

entrepreneurs use their ideas to tap in to markets that do not exist or improve existing markets, which is a source for generation of GDP. In combination with the job creation ratio in these kinds of companies, they can be regarded as potential growth engines and they play a key role in scaling up national economies. Consequently, it is essential that financing options for these companies are established.

As mentioned, the scope of financial regulations reaches beyond stable financial markets. The reverse side of the restrictions imposed by Basel III on the banking- and financial sector would be narrowing of activities essential to national economies, such as companies' access to capital.

A study on financial accessibility done by Asian Development Bank (ADB)[3] and OECD finds that access to finance is the most significant challenge for entrepreneurs and the creation, survival and growth of small businesses, especially those involved in innovation. This is a long-standing obstacle that limits SME growth in countries where SMEs have limited access to both debt and equity capital (ABD and OECD, 2014, p. 14).

According to the OECD Scoreboard (2014), financing conditions for SMEs remain a pressing concern (OECD, 2014, p. 1). Large companies are usually backed by big banks and public markets, while new and small businesses often find it difficult to access capital. They are either not able to get bank funding, or they are exposed to high interest rates of requirements for collateral (Hillel-Tuch, 2014, pp. 6-7). Interest rates in general have decreased after the financial crisis, but the interest spread between SMEs and large firms have increased in most OECD countries. Whether or not there is a causal connection between interest rates and performances of SMEs is hard to say, but the scoreboard finds that SME non-performing loans and bankruptcies have increased in the recent past (OECD, 2014, p. 1).

Alternative sources of funding for SMEs and entrepreneurs are good substitutes for bank lending, but capital from these sources is not acquired without difficulties. Government institutions and organizations attempting to ease difficulties of acquiring funds for SMEs and entrepreneurs, through guarantees and public-private collaboration, are not automatically granted (OECD, 2014, p. 1). In addition, investment capital and venture capital is often concentrated in regions, e.g. New York and Silicon Valley in the US, which makes location an important factor for SMEs and entrepreneurs. Development of such companies is therefore geographically restricted. (Hillel-Tuch, 2014, pp. 6-7).

[3] See Section 6 for countries included.

3. The Bank for International Settlements - Basel

Even though the primary focus of this paper is to analyze the effects of the latest Basel regulation, Basel III is an evolvement of the first Basel regulation. To be able to grasp the complexity and understand the effects of Basel III, and to be able to analyze possible effects of the new regulations, it is essential to compare it to its origin and isolate the changes that will affect today's economic situation. It is therefore essential to get a short introduction of the preceding regulations.

In 1930, the Bank for International Settlements (BIS) was established. It functions as an international financial institution and the main platform for cooperation between the world's central banks (The Bank for International Settlements, 2014). Their main function between World War II and the early 1970s was to implement and defend the Bretton Woods system[4]. The Bretton Woods system broke down in 1973. Following the collapse of the system was several economic casualties. In response to these calamities, the central bank governors from the G10[5] countries formed a Committee on Banking Regulations and Supervisory Practices, later known as the Basel Committee on Banking Supervision (BCBS) (Bank for International Settlements, 2014, p. 1). Their purpose, according to BIS's description is the following:

> "The Basel Committee is the primary global standard-setter for the prudential regulation of banks and provides a forum for cooperation on banking supervisory matters. Its mandate is to strengthen the regulation, supervision and practices of banks worldwide with the purpose of enhancing financial stability" (Bank for international settlements, 2014).

The casualties caused by the breakdown of the Bretton Woods system and the oil- and debt crisis in the 1970s and 1980s brought attention to and paved way for regulation and supervision of banks operating on an international level. The integration and development of international markets and globalization created a need for regulations across borders. The need was amplified

[4] The Bretton Woods system was an international monetary system established in 1944 to free international trade and fund post war reconstruction. The system was a gold-based and tied the US dollar to gold in the ratio 1USD to 35oz of gold. The other countries in the system agreed to trade US dollar to keep their currency fixed to the US dollar within a 1% range (Stephey, 2008).

[5] The Group of Ten (G10) comprises Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States. The group of G10 countries consult and co-operate on economic, monetary and financial matters (OECD, 2014).

by the Asian crisis in 1997, which created an international economic downturn. The BCBS' first regulation was the Basel Capital Accord in 1988, known as Basel I (The Bank for International Settlements, 2014).

3.1 The Basel Capital Accord- Basel I

The member countries of the Basel Committee desired to slow down the liberalization of capital markets by curbing the erosion of capital standards that was observed in the 1980s (Bank for International Settlements, 2014, pp. 2-3). As the BCBS states in "International convergence of capital measurements and capital standards" (1988), there were two elementary objectives in the Committee's work towards a uniform understanding of capital sufficiency measurement; (i) enhance international financial stability and (ii) consistency in regulations across borders to promote competitive equality in the international banking system (Basel Committee on Banking Supervision, 1988, pp. 1-3).

In the 1988 Basel Accord (henceforth referred to as Basel I), the prime focus was capital sufficiency. The supervisory structure (regulation) devised was based on a universal risk appraisal. Credit risk[6] is one of the primary risks incurred by banks, which led to minimum[7] capital standards addressing capital in relation to credit risk (Basel Committee on Banking Supervision, 1988). Basel I required a fixed capital ratio[8] minimum of 8 % (Bank for International Settlements, 2014, p. 2).

3.1.1 The Components of Capital

The mandatory total capital backing of weighted assets was a minimum of 8 % and a core capital backing of at least 4 %. Total capital under Basel I is divided into two tiers. The reason for the classification of capital is that core capital (henceforth referred to as Tier 1) is the only capital element common in all countries' banking systems. Tier 1 capital is also utterly detectable in published accounts, which is the base of the market appraisals of capital adequacy. Equity capital and disclosed reserves constitutes Tier 1 capital. Equity capital is defined as

[6] Credit risk is the risk of loss if a borrower fail to repay a loan or other financial obligations at a point in the future. Investors are compensated through credit risk premiums. It is also viewed as counterparty risk of failure.

[7] The Accord's minimum standards were originally meant for internationally active banks, which made it feasible for governments to impose national standards in addition to the international requirements (Bank for International Settlements, 2014).

[8] $Basel\ capital\ ratio = \frac{capital}{risk-wighted\ assets} = \frac{capital\ (tier\ 1 and\ tier\ 2)}{assets\ (weighted\ by\ credit\ type) + risk\ equivalents}$ (Jablecki, 2009).

issued and fully paid ordinary shares or common stock and non-cumulative perpetual preferred stock (excluding cumulative preferred stock). Disclosed reserves includes published reserves from post-tax retained earnings or other surpluses, for example share premiums, retained profit, general reserves and legal reserves (Basel Committee on Banking Supervision, 1988, pp. 3-4).

Supplementary capital (Tier 2) are the other elements of capital up to an amount equal to Tier 1. The capital elements in Tier 2 are included by choice by national authorities based on their internal accounting and supervisory regulations (Basel Committee on Banking Supervision, 1988, pp. 3-4). Details on capital that constitutes Tier 2 and restrictions applied to these types of capital are described in Appendix 1.

3.1.2 Deductions from Capital

The Basel Committee decided to include some deductions from the capital base for the function of calculating the risk-weighted capital ratio. The argument is that the committee wanted to reduce the probability of the banking system creating cross holding of capital in favor of raising capital externally, creating double gearing. Double gearing may impair the objective of the regulation, because potential problems spreads faster between institutions in the system, making it vulnerable.

For Tier 1, the only deduction is goodwill. In the case of total capital, the deduction included investments in unconsolidated banking/financial subsidiary companies and in the capital of banks/financial institutions. If there were no deduction practiced, a bank's reserves of other banks' capital instruments will have a risk weight of 100%. In addition, mutual cross holdings of capital for the purpose of unnaturally boosting the capital situation is not legal (Basel Committee on Banking Supervision, 1988, pp. 7-8).

3.1.3 Risk Weights

There are different methods for valuing risk, but the Basel Committee agreed upon a risk-weighted approach. Hence, capital adequacy is calculated by linking capital to classes of assets and off-balance-sheet risk weighted by relative riskiness. The committee argues that this *standard approach* is preferred because it makes it easier to make international comparisons despite of differences in system structure. It includes off-balance-sheet exposures and it does not penalize holding liquid, low risk assets. The system has five classes of risk: 0, 10, 20, 50, 100% and only focuses on credit risk. There are some exceptions from the standard risk weights concerning national differences, transfer risk, collateral and guarantees. These exceptions

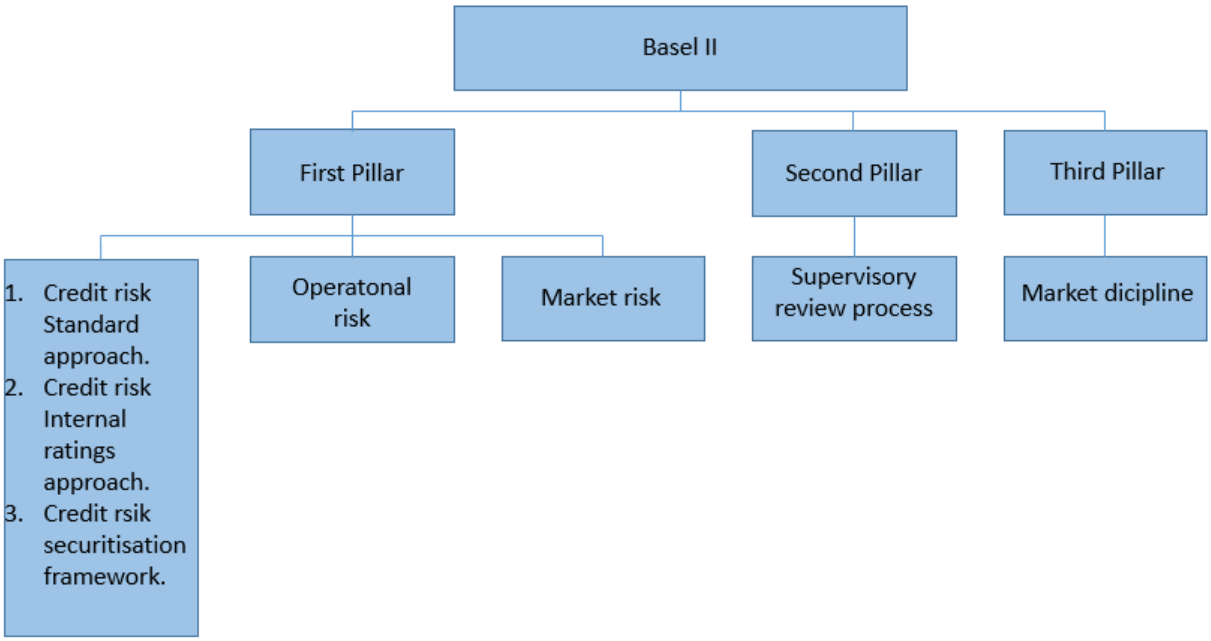
together with applicable risk weights for on- and off-balance sheet assets are briefly described in Appendix 1, Table 2 and Table 3**.**

3.2 Basel II

Basel II is a revised version of Basel I hence, the regulations described in the previous subsection is applicable aside from the changes described here.

After the release of Basel I, the committee announced several amendments to improve and expand the scope of the regulations. Despite the amendments, due to financial innovation and to better reflect the underlying risk, the Basel Committee suggested a new capital adequacy framework in June1999. In June 2004, Basel II was released. The new regulations constitutes of three pillars:

Figure 1: Basel II Framework Structure



Source: (Basel Committee on Banking Supervision, 2006, p. 22)

An important alteration in the Basel II regulation was increased use of banks' *internal risk evaluation systems* to determine required capital. The use of internal risk-weights required Basel II to form a detailed set of minimum requirements to ensure the integrity of internal assessments. The regulations expect national supervisors to create reviewed methods to assure adequate internal system methods for capital calculations. The argument for accepting internal methods was that it opened for using approaches more compatible with individual infrastructure and conditions of national financial markets (Basel Committee on Banking Supervision, 2006, pp. 1-5).

3.2.1 First Pillar - Minimum Capital Requirements

An extension of the regulations in Basel II implied that requirements put on international banks apply to not only banks, but also potential holding companies that own banks or other financial institutions that fall under the regulations. It does however not apply to any company that owns a holding company with these types of subsidiaries.

3.2.1.1 Credit Risk

Credit risk can be calculated using two methods, (i) the standard approach (in accordance with external credit assessments) or (ii) the IRB approach. The standard approach is the same as in Basel I, with some general alterations and additions regarding exposures to securitization, securities financing transactions, and derivatives exposing banks to counterparty credit risk. [9] (Basel Committee on Banking Supervision, 2006, p. 19). For banks using the IRB approach, the Basel II regulation imposes additional restrictions on capital in Tier 1 and Tier 2 due to risk related to internal calculations. These additional restrictions are described in Appendix 2.

The Internal Rating Based Approach

The IRB approach is complex and this subsection is only an overview of the core elements of the method.

The IRB approach provides banks the opportunity to use their own estimates of risk in calculating required capital for a given exposure. The IRB method uses risk components as probability of default (PD), loss given default (LGD), exposure at default (EAD) and effective maturity. A bank does not have to estimate all components; but may use supervisory values for one or more of the components. The approach is based on unexpected losses (UL) and expected losses (EL), where the UL portion is produced by risk-weight functions.

The risk components are used as input in risk-weight functions developed for different asset class exposures. Under the framework, there are five asset classes; (i) corporate, (ii) sovereign, (iii) bank, (iv) retail, and (v) equity[10]. Some of the asset classes have subclasses. There are different IRB methods, but they are all subject to minimum requirements.

[9] The exceptions, additions, methods and calculations are addressed in Basel II section 53-210. Exposures to securitization, Securities financing transactions and derivatives exposing banks to counterparty credit risk are described in Part 2, section IV and Annex 4 of the Basel II regulation.

[10] Comprehensive definitions and conditions for the five classes of asset exposures are set out in Part 2, section 218-243 in The Basel II regulations.

The minimum requirements for the IRB approach are related to inter alia calculation of risk components; supervisory estimates for the risk components; use of internal ratings; validation of internal rating; and disclosure requirements. The requirements also apply across asset classes (Basel Committee on Banking Supervision, 2006, pp. 52-53).

Small- Medium Sized Entities (SMEs)

Credit to SMEs is classified as corporate or retail exposure. Using the IRB approach for corporate or retail credit, banks are permitted to differentiate exposures to SMEs and larger firms, using reported sales or total assets as threshold and firm size adjustment.

(1) $Firm\ size\ adjustment = 0{,}04 * \frac{1-(S-5)}{45}$

* S=total annual sales $[€5\ million - €50\ million]$ (Basel Committee on Banking Supervision, 2006, p. 64)

Given annual sales above €6 million, the firm size adjustment is negative, thus reduces exposure applied to SMEs. Implications are further discussed in the analysis, section 6.2.

3.2.1.2 Operational Risk

The focus on operational risk is set out to motivate banks to carefully monitor the risk it attracts through it operations. Operational risk is defined as risk of loss caused by insufficient or failed internal processes, systems and people or outside incidents[11]. The framework presents three methods for calculating operational risk; (i) the Basic Indicator Approach; (ii) the Standardized Approach; and (iii) Advanced Measurement Approaches (AMA). Banks are expected to use the method suited for their operational risk exposure, sophistication and risk sensitivity (Basel Committee on Banking Supervision, 2006, p. 144).

3.2.1.3 Market Risk

Risk of losses in on- and off-balance sheet positions merging from changes in market prices is classified as *market risk*. Market risk is connected to instruments and equities exposed to interest rates in the trading books, foreign exchange risk and risk related to assets throughout the bank. The objective for introduction of market risk is to encourage careful risk assessment of market positions by inter alia value adjustments, price verifications and valuing market positions (Basel Committee on Banking Supervision, 2006, p. 157).

[11] Including judicial risk, but excluding risk related to strategy and reputation.

3.2.1.4 Total Risk Weight

Total risk-weighted assets are calculated by (i) multiplying capital requirements for market and operational risk by 12.5[12], and (ii) adding it to the sum of risk-weighted assets for credit risk (Basel Committee on Banking Supervision, 2006, pp. 12-14).

The second and third pillar are important for the supervisory governance of banks and the financial markets, but for the purpose of this paper, it does not add value to the discussion. Hence, the following subsections will only introduce the main objectives of these two pillars.

3.2.2 Second Pillar- Supervisory Review Process

The supervisory authorities need to evaluate the banks' judgments of capital needs and risk exposure, and identify inadequacies to secure effective effects of the framework. The second pillar sets out the main principles, guidelines and requirements for supervisory review, transparency, and responsibilities.

The main objective of Pillar 2, in addition to keeping adequate capital to cover risk exposures, is to motivate banks to use better risk management methods and develop internal assessments more suitable for the banks risk profile. Areas to be considered under the second pillar are internal and external factors as well as risk that are not considered under the first Pillar, especially assessments of the advanced IRB approach (Basel Committee on Banking Supervision, 2006, p. 204).

3.2.3 Third Pillar- Marked Discipline

The objective for the third pillar is to enhance the two other pillars with motivations for market discipline, by imposing disclosure requirements on banks using the framework. With the introduction of an optional IRB approach to risk, openness about risk assessments is essential in the market. Disclosure requirements allows for more informed comparisons of market participants[13] Disclosure requirements will make the market more transparent and potentially reduce cases of asymmetric information. Market participants will have access to key information about risk exposures, assessment processes and capital adequacy. (Basel Committee on Banking Supervision, 2006, pp. 226-227).

[12] Corresponding to the minimum 8% capital ratio.

[13] The disclosure requirements are presented in Part 4 section II of the Basel II framework page 228-242.

3.3 Basel III

Basel III continues to build on the three pillars from Basel II. The requirements of the new regulations are more complex, in order to match the increasing complexity of banking and financial institutions. The initiative for new supervisory reforms occurred in the wake of the financial crisis of 2007-2009.

Due to jurisdictional differences in the definition of high quality capital, Basel III has a different structuring of capital for the purpose of risk-weighted required capital. In addition, the Committee also felt that the previous level of 8% required regulatory capital coverage was insufficient (Basel Committe on banking supervision, 2011, p. 12).

3.3.1 Minimum Capital Requirements- Definition of Capital

Under the Basel III regulation, total regulatory capital consists of (i) Common equity Tier 1, (ii) additional equity Tier 1 and (iii) Tier 2 capital. The total capital to risk-weighted assets (RWA) is still 8%, but common equity Tier 1 capital must be at least 4.5% of RWA and Tier 1 capital must be at least 6% of RWA. This modification suggests that the committee has an increased focus on high quality capital. (Basel Committe on banking supervision, 2011, p. 28). Banks, banking groups and holding companies whose capital is being measured, will henceforth be referred to collectively as banks in this section.

Common Equity Tier 1

Capital approved by the committee to constitute common equity Tier 1 (CET1) includes common shares issued by the bank to meet the criteria for regulatory purposes[15] (or the equivalent for non-joint stock companies), stock surplus from issuing instruments, retained earnings, accumulated other comprehensive income and other disclosed reserves[16].

Common shares issued by consolidated subsidiaries of the bank and held by third parties' (minority interests) Tier 1, may be included in common equity under the two conditions. (i) If issued by a bank, the instrument creating minority interests meets all the restrictions to qualify as common shares for regulatory purposes and(ii) the subsidiary issuing the instrument is a

[15] Most internationally active banks are structured as joint stock companies. These banks must meet the criteria exclusively with common shares.

[16] Includes temporary profits under audit methods decided at national discretion. Dividends are not included.

bank[17]. Criteria for classification as common shares for regulatory capital purposes are presented in Table 4 in Appendix 3.

Deductions from CET1 in addition to those proposed in Basel I and Basel II, is described in detail in "Basel III: A global regulatory framework for more resilient banks and banking systems", Part 1 B section 5 and 6 (Basel Committe on banking supervision, 2011, pp. 12-15).

Additional Tier 1 Capital

The additional Tier 1 capital constitutes of instruments issued to meet the criteria for additional Tier 1 capital, but not included in common equity Tier 1 capital and stock surplus[18] from the issuing of these instruments. As for common equity Tier 1 capital, common shares issued by consolidated subsidiaries of the bank and held by third parties may be included, but under additional requirements. Minimum criteria for instruments to be included in Additional Tier 1 capital are presented in Table 5 in Appendix 3 (Basel Committe on banking supervision, 2011, pp. 15-17).

Tier 2 Capital

Tier 2 capital constitutes of instruments issued to meet the criteria for Tier 2 capital, but not included in Tier 1 capital and stock surplus[19]. As for common equity Tier 1 capital, common shares issued by consolidated subsidiaries of the bank and held by third parties may be included, but under additional requirements. Minimum criteria for instruments to be included in Tier 2 capital are presented in Table 6 in Appendix 3 (Basel Committe on banking supervision, 2011, pp. 17-19).

3.3.2 Capital Conservation Buffer

The Basel Committee suggests introduction of a capital conservation buffer for the purpose of making sure banks build up capital buffers in periods with little to no stress. The objective is to ensure that banks do not fall below the minimum capital requirements in periods of incurred losses. The committee suggests banks hold capital buffers above the regulatory minimum by for example reduce dividend payments and bonus payments or by raising new capital form

[17] Additional regulations on how to calculate the amount of third party common shares by consolidated subsidiaries to be included in the bank's common equity Tier 1 capital are described in section 4 in Basel III: A global regulatory framework for more resilient banks and banking systems pp. 19-20.

[18] Stock surplus, not qualified for common equity Tier 1, can only be included in additional Tier 1 capital if the surplus origin from shares allowed to be included in additional Tier 1 capital.

[19] Stock surplus, not qualified for Tier 1 capital, can only be included in additional Tier 1 capital if the surplus origin from shares allowed to be included in Tier 2 capital.

private sector[20], to reduce probability of breach of minimum requirements in periods of stress. The share of retained earnings for the purpose of building capital buffers should increase if banks' capital levels fall towards the minimum requirements.

The buffer increases the robustness of the sector going into a downturn in the economy, and provides a mechanism for rebuilding capital in the early stages of economic recovery. The capital conservation buffer is also part of reducing procyclical behavior by ensuring available capital to support ongoing operations.

A capital conservation buffer of 2.5 % (Common equity Tier 1)[21] is added to the minimum capital requirement. If a bank's capital levels falls into that range, capital distribution constraints will be imposed on the bank (only on distributions, not the operations). The capital constraints increase with falling levels of capital[22].

The table below (Table 1) shows capital conservation ratios for different levels of common equity Tier 1 capital ratios. The capital conservation ratios in the table imply how much of the earnings a bank must conserve at given CET1 levels, unless it raises capital in the private sector (Basel Committe on banking supervision, 2011, pp. 54-56).

[20] The cost and risk of building a capital buffer should not be imposed on depositors and may not under Basel III be used as a signal of financial strength.

[21] Capital have to cover the minimum requirements (6% / 8%) before it can contribute to the capital conservation buffer.

[22] To not confuse the buffer with a new minimum requirement banks in the top rage of the buffer will only have mild distribution constraints.

Table 1- Individual Bank Minimum Capital Conservation Standards

Common Equity Tier 1 ratio	Minimum Capital Conservation Ratios[23] (expressed 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: (Basel Committe on banking supervision, 2011, p. 56)

*Earnings is defined as distributable profits, before deduction of elements under restrictions, and after tax (before any distributable payments).

3.3.3 Countercyclical Buffer

A new addition to capital requirements imposed by Basel III is the countercyclical buffer. The buffer will be added to the minimum capital requirements in periods of excess credit growth and removed in times of economic distress. The purpose of this buffer is to reduce banks' procyclical behavior. Additional requirements in an economic growth period reduce access to credit[24], while reduced requirements during a downturn will allow banks to stimulate the economy by continuing their operations. By preying on the countercyclical buffer, banks can continue activities without falling under the minimum capital requirements. The countercyclical buffer is an extension of the conservation buffer and distribution restrictions will be required of banks that do not meet the requirements.

The buffer will be determined at national discretion by national regulatory authorities. For internationally active banks, the added buffer will be a weighted average of the buffers imposed across all the jurisdictions to which it has credit exposures. The buffer will vary based on credit exposure and economic situations in the range of 0% to 2.5%, and must consist of CET1 capital or other fully loss absorbing capital (Basel Committe on banking supervision, 2011, pp. 57-60).

[23] The CET1 ratio does not include Additional Tier 1 capital and Tier 2 capital to meet minimum capital requirements. A bank meeting the minimum requirement of 8% with exclusively CET1 capital implies the bank have no conservation buffer hence, it is subject to a 100% constraint on capital distributions.

[24] Excess aggregate credit growth is often associated with increased a buildup of system-wide risk.

3.3.4 Systemically Important Financial Institutions (SIFIs)[25]

The Basel Committee introduces an additional requirement for Systemically Important Financial Institutions (SIFIs) in Basel III. SIFIs pose a greater risk to the financial system, thus they must have a higher capacity to absorb potential losses. Under Basel III, these institutions are required to keep additional 1% to 2.5% CET1 capital to increase loss absorbency. The additional requirements are decided by how important the institution is for the system as a whole (Basel Committee on banking supervision, 2014).

3.3.5 Risk Coverage[26]

To address the issues of capturing on- and off- balance sheet risks and exposures, the committee implemented reforms in Basel II and further in Basel III. These reforms seek to strengthen capital requirements for counterparty credit exposures, complex securitizations, repos and financing activities. The reforms also include the above-mentioned items in the banks' trading books.

The objective is to reduce systemic risk across the financial system and strengthen focus on risk treatment. Measures under the reforms are capital charge for potential market-to-market losses, credit analyses for externally rated securitization exposures, introduction of stressed Value at Risk (VaR) frameworks and increased risk weights (2%) for central counterparty exposures (CCPs) and higher capital for inter-financial sector exposures (Basel Committe on banking supervision, 2011, pp. 3-4, 29) .

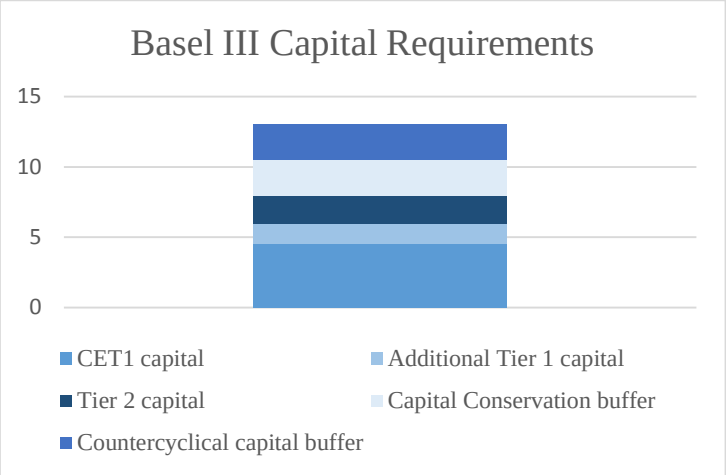
3.3.6 Pillar 2 and Pillar 3

These reforms increase the standards for the second Pillar. Supervisory review with more comprehensive supervision motivates better management of risk over the long term. The reforms also reinforce Pillar 3 (market discipline) disclosures. Reforms to extend risk coverage focus on off-balance sheet vehicles and securitization (a big problem during the financial crisis), to improve disclosures of the components of regulatory capital and their corresponding accounts. Comprehensive explanations of a bank's calculations of capital ratios will improve market transparency (Basel Committee on banking supervision, 2014).

[25] This requirements apply to systemically important banks as well (SIBs)

[26] Part 1, II of Basel III: A global regulatory framework for more resilient banks and banking systems lays out a detailed description of these measures and calculations.

Figure 2: Basel III Required Capital Coverage*



* does not include the additional requirements for SIFIs.

3.3.7 Leverage Ratio

From previous crises, we have observed that high leverage ratios have a negative impact on markets, asset prices, cost of funding (in contradiction to Modigliani and Miller 1958), and credit availability. Hence, the Basel Committee decided to introduce a *leverage ratio requirement* in Basel III. The introduction has two purposes. First, reduce leverage in the banking sector, and thereby reduce the risk of damaging the financial system and the economy in a possible deleveraging process. The second objective is to use leverage ratio constraints as a preventive measure against model risk and measurement errors in the risk based method. Unlike the complex IRB methods, leverage ratio is simple, transparent, and includes off-balance sheet exposures. Leverage ratio functions as a backstop for the risk-based capital requirements. It should however be emphasized that leverage ratio is a supplement and not a substitute for risk-weighted capital requirements.

The leverage ratio is calculated by an average of monthly leverage over the quarter based on specific definitions of capital and total exposure. Currently, the committee has decided to require a minimum Tier 1 leverage ratio of 3% in the time period January first 2013 to January first 2017[27].

[27] Additional requirements in the transition phase are outlined in Basel III: A global regulatory framework for more resilient banks and banking systems, paragraph 165 to 167.

Capital Measure

The capital measure is based on the Tier 1 capital defined under Basel IIII. Any deductions form capital will also be deducted from exposure, for the purpose of calculating leverage ratio.

Exposure Measurement

Exposure is measured in compliance with accounting measures of exposure[28], which implies using the accounting balance sheet. Securities financing transactions (SFT) should be included with accounting measures of exposure, but using netting rules form the Basel II regulation. Derivatives should be valued by the value of the contract or notional economic exposure representing underlying interest of the contract. The same exposure measure applies as for SFTs, but with an ad-on for future exposure to convert the derivatives to a "loan equivalent" amount.

Commitments, credit substitutes, acceptances, standby letters of credit, trade letters for credit, failed transactions and unsettled securities, repurchase agreements and STFs (described in Basel II) are big sources for leverage. Hence, the committee has decided to apply a 100% credit conversion factor (CCF) unless the items are unconditionally cancellable claims, they then attract a 10% CCF (Basel Committe on banking supervision, 2011, pp. 4, 61-63).

3.3.8 Global Liquidity Standard

Comprehensive capital requirements are important in securing a stable banking sector, but as the financial crisis emphasized, it is not adequate. Despite sufficient capital levels, lack of liquidity and proper liquidity management by banks resulted in a nonfunctional financial market. The rapid change in market conditions shed light on how fast liquidity is weakened, and the consequences of long-lasting illiquidity (Basel Committe on banking supervision, 2011, p. 8).

The Basel Committee decided to implement two minimum standards for funding liquidity, and a set of monitoring metrics to improve international supervisory monitoring. The regulations have two objectives. The first is to motivate short-term resilience of a bank's liquidity risk. Liquidity Coverage Ratio (LCR) will ensure that banks have sufficient high quality liquid assets to survive a 30-day pressured financing scenario (Basel committe on banking supervision, 2013, pp. 1-7). Further, the second objective is to ensure long-term resilience by introducing the Net

[28] Netting of loans and deposits is not allowed. On-balance sheet exposures can not be reduced by collateral, guarantees etc. On-balance sheet, non-derivative exposures are net specific provisions and valuations adjustments.

Stable Funding Ratio (NSFR). The NSFR covers the entire balance sheet and motivates use of stable sources of funding and by that, addressing liquidity mismatches (Basel Committee on banking supervision, 2014).

Liquidity Coverage Ratio

The purpose of the LCR is to make sure global banks have sufficient accessible, high-quality liquid assets (HQLA) to balance out the net cash outflows banks might experience in a severe short-term (one month) stress scenario. This scenario involves remarkable stress, yet not a worst-case scenario[29].

$$(2)\ LCR = \frac{Holdings\ of\ unencumbered\ high\ quality\ liquid\ assets}{Accumulated\ net\ cash\ outflow\ over\ 30\ days\ under\ stress} \geq 100\%^{30}$$

Or,

$$(3)\ LCR = \frac{Stock\ of\ HQLA}{Total\ net\ cash\ outflows\ over\ the\ next\ 30\ calendar\ days} \geq 100\%$$

(Basel committe on banking supervision, 2013, p. 7)

Assets qualified as HQLA and cash flows, with factors[31], are outlined in Table 7- 9 in Appendix 3.

Net Stable Funding Ratio

The NSFR requires a minimum stable source of funding relative to liquidity profiles of assets and potential need for liquidity for off-balance sheet commitments over a one-year horizon, calculated as in the equation below. The NSFR motivates a better evaluation of liquidity risk for all assets in a longer perspective.

$$(4)\ NSFR = \frac{Available\ stable\ funding}{Nessecary\ stable\ funding\ over\ one\ year} \geq 100\%$$

(Basel Committe on banking supervision, 2011, pp. 8-10), (Basel committe on banking supervision, 2013, pp. 1-7).

[29] Losses of funding and deposits or increased haircuts and required collateral and substantial calls on exposures.

[30] Gradually build up to a 100% coverage for both LCR and NSFR.

[31] A percentage factor to be multiplied with the amount of asset or item in cash flows for the purpose of calculating leverage ratio.

3.3.9 Basel III and Small- Medium Sized Entities (SMEs)

The Basel Committee introduced the "SME compromise", which involves that some loans can be viewed as part of a retail portfolio, given that total credit to one borrower does not exceed €1 million. A risk weight of 75% will be applied to the retail portfolio. The SME loans have to be backed by 6 % capital (Angelkort & Stuwe, 2011, pp. 12-13).

4. Impact of the New Basel Regulations

Whether we can see the same impacts of Basel II as for the two previous editions of the Basel banking regulations is yet to be determined. However, there is no doubt that regulations change the rules of the game. Banks will adapt to the new regulations and that will revise their current operating strategies.

It is difficult to predict exactly how banks will adapt to the new regulations. To address the issue, I will look at theory and empirical studies from the implementation of the previous Basel regulations. Empirically, it has been observed that in cases of implementing new regulations, institutions that are exposed to the regulations will seek to find loopholes. Until Basel III is implemented in full, these alternative and innovative ways of adapting to the new requirements can not yet be detected. In addition, empirically and due to a gradual implementation of the new regulations, the affected banks and financial institutions have time to adapt and in most cases meet the requirements before the given time limit.

4.1 Cost of Funding

The cost of funding relates to the cost of capital based on the composition of debt and equity. One of the most famous theories for cost of funding is the Modigliani and Miller theorem (1958)[32]. Despite of the drastic simplifications and lack of assessment of changed risk of default with increased excess debt, it is still used as a reference when addressing issues regarding cost of funding and an assumption for many economic models.

4.1.1 Modigliani and Miller (1958)

Modigliani and Miller (1958) concluded that "the capital structure of a firm is a matter of indifference: and that consequently, one of the core problems of corporate finance - the problem of the optimal capital structure for a firm - is no problem at all" (Modigliani & Miller, 1958, p. 291).

The 1958 article stated that despite the fact that interest rates may rise with leverage and hence an increased cost of borrowed funds as debt rises, the cost of funds for *all* sources is unaffected by leverage (apart from tax effect) (Modigliani & Miller, 1958, p. 273). MM explained this by assuming that leverage in any financial structure can be "undone" by obtaining a beneficial mixed portfolio of bonds and stocks through arbitrage opportunities. By doing this, the ratio of earnings to market value, i.e. average cost of capital from all sources, must be the same for all

[32] Modigliani and Miller (MM) revised their article from 1958 in 1961 and later in 1963.

firms in a given class[33]. Thus, the rise in cost of borrowed funds caused by increased leverage will tend to be offset by an equivalent reduction in the yield of common stock (Modigliani & Miller, 1958, pp. 273-274).

Criticism

Despite the fact that it is necessary to make assumptions in order to make a theory, MM argued that the composition of debt and equity does not affect cost of funding. The value of the company is therefore not affected by their financial obligations or the capital distribution. The negative effects of leverage was seen in the most recent financial crisis, when banks struggled with acquiring finance, needed bailouts and went bankrupt. Thus, the arguments in the theory do not hold. Although the MM theorem is based on the same assumptions as the Efficient Market Hypothesis (EMH), a perfect market with rational investors, the proposed usage of arbitrage opportunities to "undo" the leverage is in strong contradiction to the EMH, which raises questions about the validity of the theory (Choudhry & Landuyt, 2010, p. 85).

4.1.2 A Different Approach to Cost of Funding

In contradiction to Modigliani and Miller (1958), it is generally stated that equity funding is more expensive than debt funding and therefore higher capital requirements as imposed by Basel III will affect a bank's total funding cost. This implies that higher capital requirements will increase banks' cost of funding. That might be the case, but one also has to take into account that a higher level of equity, given unchanged assets, reduces the volatility of equity and therefore the required return. A second aspect is the fact that more equity makes a bank's debt less risky and lowers the required return on debt. This might be offset by guarantees that might raise the cost of funding with higher equity ratio.

Bent Vale (2011) makes an attempt to address the question of whether financial structure has an effect on cost of funding or not. In his paper, Vale uses the Modigliani and Miller theorem as a starting point (Vale, 2011, p. 1). Assuming a bank is financed with equity (E) and debt (D) with required return R_E and R_D, respectively, the Funding cost (FC) can be written as:

(5) $$FC = \frac{R_E E + R_D D}{D + E}$$

Defining an equity ratio e=E/(D+E) and assuming R_E and R_D to be decreasing in e due to reduced volatility and risk, one can rewrite FC as:

[33] For calculations and assumptions, see Appendix 4.

(6) $FC = R_E(e)e + R_D(e)[1 - e]$

To analyze the effect of increased e one can derive FC with respect to e[34]:

(7) $dFC = [R_E - R_D]de + \frac{\partial R_E}{\partial e} e * de + \frac{\partial R_D}{\partial e}[1 - e]de$

Equity is riskier than debt, which implies that the first term is positive. The second and third terms are negative because $\frac{\partial R_E}{\partial e}$ and $\frac{\partial R_D}{\partial e}$ are negative[35]. Defining the second term as the equity premium effect and the third term as the debt premium effect. Under the MM theorem, function (7) is equal to zero (Vale, 2011, pp. 2-3).

In cases of the banking industry, possible guarantors are the government with deposit insurances and the problem of too big to fail. Even though the government does not necessarily volunteer as a guarantor for banks on a case-to-case basis, the fact that bank failures have a massive impact on the economy (as with Lehman Brothers in 2008) has resulted in several bailouts. Many banks use the fear of a collapse of the financial system to their benefit. The too big to fail mentality provokes some cases of moral hazard problem between banks and governments.

Vale further denoted R_{Dg} as the required return on debt in cases of a debt guarantee. Substituting R_D with R_{Dg} in function (7) gives an effect on the private funding cost (PFC) (i.e. total funding cost) of:

(8) $dPFC = \left[R_E - R_{Dg}\right]de + \frac{\partial R_E}{\partial e} e * de + \frac{\partial R_{Dg}}{\partial e}[1 - e]de \ > 0$[36]

Function (8) implies that in the presence of a guarantor the total funding cost will increase with a higher equity ratio (Vale, 2011, p. 5). Even though these theoretical calculations are under several conditions, the same procedure has been used by several economists to calculate the changes in cost of funding due to changed equity ratio[37].

[34] Note, because R_E and R_D are functions of (dependent on) e we need to use partial differentiation.

[35] An increase in equity relative to debt reduces the required return on equity and debt.

[36] The social funding cost i.e. including the cost to the guarantor of being paid less than the recognized fair premium, includes a term for the guarantors cost which is negative when it is differentiated with respect to e. Private funding cost is the social funding cost minus the guarantors cost. The derivative social funding cost is equal to zero, which implies that removing the negative term from the guarantors cost leaves the derivative of private funding cost to be positive.

[37] Kashap, Stein and Hanson (2010) and Miles, Yang and Marcheggiano(2011) (Vale, 2011, p. 10).

4.2 Basel Capital Ratio

To meet the increased capital requirements of the Basel III regulation banks could either increase the numerator or reduce the denominator in the capital ratio fraction, equation (9).

$$(9)\ Basel\ capital\ ratio = \frac{capital}{risk-wighted\ assets} = \frac{capital\ (tier 1 and\ tier\ 2)}{assets\ (weighted\ by\ credit\ type) + risk\ equivalents}$$

Banks that already exceed the new capital requirements do not necessary have to do either of the two subsequent measures. How they choose to respond to the increased capital adequacy requirements is dependent of their own internal targets for capital ratio.

4.2.1 Increasing Equity Capital

An increase in the numerator can be done by either raising equity in the market or withhold payments to dividends and bonuses.

A problem related to procurement of equity, e.g. through issuance of new shares, is the presence of asymmetric information[38]. New external investors have less knowledge about the value of the firm than managers acting on behalf of old shareholders. Due to the asymmetric information, present shareholders might become diluted because they have to sell shares at undervalued price. The imbalance of information raises another problem, the so-called "lemons problem". Banks that are overvalued have the strongest incentive to issue new shares, which leads to issuance of new shares being interpreted as a negative signal to the market (Vale, 2011, pp. 11-12).

Due to frictions in the market for equity and the fact that withholding dividend payments and bonuses is usually not a popular strategy amongst shareholders and employees, it is usually preferred for banks to reduce the denominator.

Most research papers look at a fictional increase of capital requirements by for example 1%, and the complexity of the Basel III regulations are not directly comparable with the stylized examples. In addition, effects are different in the transition phase from the long-term effects. In the case of adapting to the new Basel regulations, the required changes are known to market participants. In addition, the third pillar of the Basel II regulations require wide disclosure of calculations of risks and assets, which means that issuing new equity in the market does not necessary send a notable negative signal to the market. Bank owners might be more

[38] A situation in which one party in a transaction has more or superior information compared to another.

customizable to raise equity in the market instead of reducing bank lending. The circumstances imply that a theoretical adaption does not necessarily occur.

4.2.2 Changing the Asset Portfolio

Reducing the denominator by adjusting the composition of assets, for the purpose of increasing the capital ratio, implies either reduction of total assets or a shift towards a less risky asset portfolio.

Reduction in Assets

The monetary policy works through several channels, normally referred to as the transmission mechanism. In recent times there has been discussion as to whether or not there is a channel that explains the reduction in credit in addition to the three standard channels (demand, currency and expectation) of the transmission mechanism.

The "bank-lending channel" was first discussed in Bernanke and Blinder (1988), where they looked at the effects of monetary policy on supply of credit (Bernanke & Blinder, 1988). The bank-lending channel is a part of the credit channel, which looks at the additional monetary policy effect on loans to households and non-financial institutions due to asymmetric information. To compensate for the difference in information, banks impose an additional external financing premium. The bank-lending channel deals with the additional cost of borrowing for banks, which affects interest on loans and the bank lending practices. Increased cost of funding might reduce the supply of credit (Jacobsen, 2012, pp. 3-5). To what extent this might affect SMEs and entrepreneurs' access to funding is debated in the analysis in section 6.2.

Due to the simplifications and assumptions done by Bernanke and Blinder (1988) there are many discussions regarding whether the bank-lending channel exists, but several empirical studies has found evidence of such an effect. Jimenez, Ongena, Peydro and Saurina (2010) researched the causal impact of the bank-lending channel and found evidence that it is the bank-lending channel and not the loan demand or quality that causes changes in credit (Jiménez, et al., 2010, pp. 13-14, 39). They also found evidence that banks with higher capital ratios are more willing to lend than banks with lower capital ratios, which implies that as a bank is close to the minimum capital requirement they would prefer to reduce its lending rather than issuing new equity (Jiménez, et al., 2010, pp. 4, 10).

Changing the Composition of the Balance Sheet

Furfine (2000) states that capital requirements is a necessary component in explaining the shifts in banks' portfolios. Shocks neither in loan demand or capital, can simultaneously explain the decline in lending *and* rise in capital ratios (Furfine, 2000, p. 14), which leads to a fair assumption that there is a connection between the structure of balance sheets and capital requirements. Thus, a probable preferred approach to acquiring adequate regulatory capital ratios.

Acquiring assets that attract lower risk weights and substituting more risky assets, such as loans to SMEs and entrepreneurs would reduce the required capital to meet minimum standards, which implies a smaller increase in cost of funding for banks. This possible effect is further discussed in the analysis in section 6.2. However, shifting towards a less risky portfolio of assets will usually imply lower returns on investments. To avoid this, many banks use regulatory arbitrage opportunities to alter the profile of their "book".

Regulatory arbitrage is a bank's effort to keep funding costs (inclusive equity) at a minimum. As mentioned, equity is perceived to be more expensive than debt. Provided that the capital requirements imposed by Basel III exceed the level of capital a bank would hold by choice, the requirements can be viewed as a regulatory tax. This taxation motivates banks to find alternative methods of adapting, hence financial innovation. Capital arbitrage makes use of deviations in true economic risk and the measure of risk in the regulatory framework (Jackson, 1999, pp. 22-25). Basel III takes in to account more complex risk measurements to reduce the possibility of arbitrage opportunities, but as seen after implementation of Basel II, complex regulations for complex systems create loopholes. The most common criticism of Basel III is precisely this.

4.3 Impacts of Liquidity Requirements

Liquidity refers to the possibility of selling an asset or in other ways converting it to cash, without attracting extravagant losses while doing so. Most assets are liquid over a long period of time. By imposing both LCR and NSFR measurements, the banks have to take into account both short-term and long-term liquidity (Elliot, 2010).

The Basel Committee published the paper "An assessment of the long-term economic impact of stronger capital and liquidity requirements" in August 2010, which attempts to calculate effects and costs of meeting capital and liquidity requirements. The paper use return on equity (ROE) as the basis measure, and compare the cost of adapting to new requirements without reducing the ROE. The calculations were done under several assumptions, including a standard

set of measures to meet the NSFR requirements; (i) change source of funding, (ii) substitute low-rated high yielding bonds for high-rated lower yielded bonds and if necessary (iii) reduce "other assets" (Basel committe on Banking Supervision, 2010, p. 24).

The changes insinuates that a change in supply of loans is not necessary, but result in lower interest income or raises interest expenses, hence a reduction in net income (Basel committe on Banking Supervision, 2010, pp. 21-23). To avoid fall in ROE, banks must increase lending spreads, beyond what is required due to higher capital requirements. A table listing the impact on lending spreads is presented in Appendix 5, Table 10.

Banerjee and Mio (2014) did an empirical analysis of the effects of liquidity regulation[39]. They found that liquidity regulations have an impact on the composition of the balance sheet (Banerjee & Mio, 2014, pp. 1-3). However, they found no evidence that liquidity requirements affect the size of banks' balance sheets or damaging effects on lending to non-financial sector, through either interests or supply (Banerjee & Mio, 2014, p. 26).

Banerjee and Mio (2014) also found that the adaption to the liquidity regulations was done by adjusting the share of HQLA to total assets, offset by a reduction in the share of short-term financial loans keeping share other assets unchanged. On the liability side, banks shifted towards stable non-bank and non-financial corporate deposits and reduced their dependence on less stable short-term funding (Banerjee & Mio, 2014, p. 26).

I addition, Bonner (2012) and Bonner and Eijffinger (2012) fond in their studies of the effects on corporate lending by liquidity regulations, that banks below their liquidity requirements did not impose higher interest rates on corporate loans, but pay higher interest rates on unsecured interbank loans (Banerjee & Mio, 2014, p. 4).

The limited impact on interest is in contradiction to the results of "An assessment of the long-term economic impact of stronger capital and liquidity requirements" and theory of the bank-lending channel. A substitution towards lower yielding HQLA and more expensive non-financial funding implies higher cost of funding, which, as discussed above, have impacts on bank behavior. How these effects influence SMEs and entrepreneurs is further discussed in the analysis in section 6.2.

It should be noted that changing the composition of the balance sheet to meet NSFR requirements by holding more high quality assets reduces the RWA and leads to synergy effects

[39] It should be noted that the dataset is based on UK banks.

for required capital (Basel committe on Banking Supervision, 2010, p. 24). Secondary the substitution towards non-financial funding reduces the transmission of shocks through an interconnected financial sector, which was a substantial problem in the financial crisis of 2007-2009 (Banerjee & Mio, 2014, pp. 1-3).

4.4 Impacts of Leverage Ratio

Because leverage does not include risk weights it motivates a high-yield asset portfolio. To maintain profitability while reducing the size of the balance sheet requires higher payoffs on the remaining assets. On the other hand, a higher risk balance sheet requires a higher RWA coverage, making it difficult to find an optimal combination of assets in the portfolio (Angelkort & Stuwe, 2011, pp. 11-14). How the banks react will depend on the relation between the required capital and required leverage ratio. The required leverage ratio is assumed to be set at a level leaving the capital ratio as the key determinant of capital requirement (Elliot, 2010).

4.5 Competition

An important aspect of how banks will choose to adapt to the regulations is impact on competition. One of the objectives of the international regulations Basel impose is to even out the competition. Due to the possibilities of additional regulations at national discretion and difference in size of banks there may be some variation in competitive conditions. The ECB bank lending survey reveals an easing of capital standards due to pressure of competitors. Jackson et al. (1999) did not find any empirical studies that directly test implications of Basel regulations on competition. The testing done on stock market responses to increased capital requirements were mixed and did not give a conclusive result on profitability.

Elliot (2010) stated that in theory there are many competing financial institutions and capital market investors, but based on his findings it appears that the capital regulations alone could not alone result in banks losing any competitive advantages relative to other sources of funding (Elliott, 2010, pp. 21-22). In addition, the Basel III regulation applies to a wider specter of financial institutions, which requires change in behavior for these institutions as well.

4.6 Empirical Studies

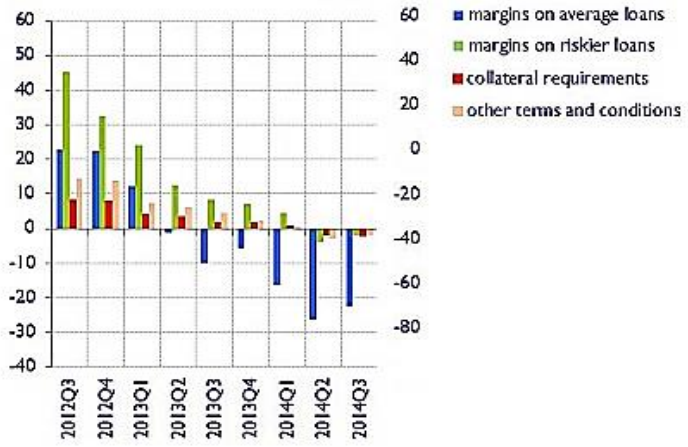
Regarding the empirical support of the development in the banking sector after the introduction, it is hard to determine if the development has a causal relationship with the introduction of Basel III. The European central bank provides a Bank Lending Survey (BLS), which monitors changes in bank lending and credit supply, and try to explain the changes. It should be noted that the numbers only represent the Euro Area. In addition, there are differences within the Euro

Area, which implies that the observed development in bank lending from the BLS report is not representative for all countries using the Basel regulations.

For 2014, Q3, banks reported a small net easing of credit standards on loans to enterprises (i.e. a negative net tightening of -2%). With regard to enterprise size, credit standards were eased on loans to large firms, but remained unchanged for small and medium-sized enterprises (SMEs). The results are still below the historical tightening average.

The factors related to banks' cost of funding, which led to easing of credit standards, were mainly the continued strengthening of banks' liquidity position, improved access to market funding and pressure from competitors. On the other hand, banks' capital position and perception of risk related to industry specific economic outlook and collateral demanded had a marginal tightening impact on credit standards (The European Central Bank, 2014, pp. 5-8).

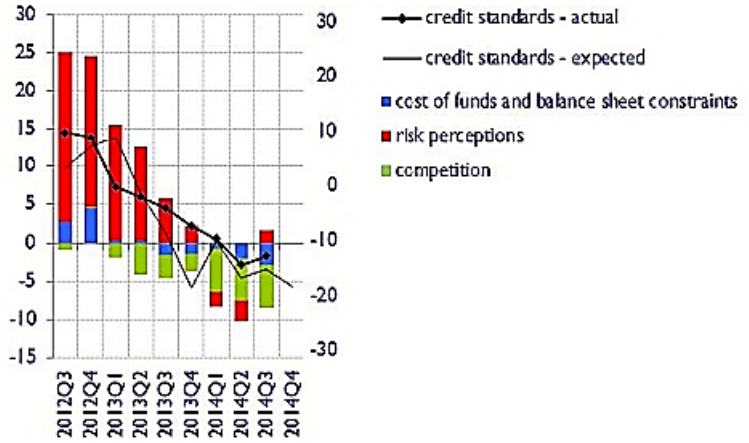
Figure 3: Changes in Terms and Conditions for Loans or Credit Lines to Enterprises (net Percentages of Banks Reporting Tightening Terms and Conditions)



Note: "other terms and conditions" are calculated as the unweight average of "non-interest rate charges", "size of the loan or credit line", "loan covenants" and "maturity". Source: (The European Central Bank, 2014, p. 8)

Figure 3 shows that the margins on riskier loans were much higher than average loans, suggesting banks required higher risk premiums for loans they perceived as more risky, presumably such as SME and entrepreneur loans. The observed development of required collateral propose that the increased requirements for collateral was related to the economic situation, because the tightening effect deceased with time and improvement of the economic situation.

Figure 4: Changes in Credit Standards Applied to the Approval of Loans or Credit Lines to Enterprises (Net Percentages of Banks Reporting Tightening Credit Standards and Contributing Factors)



Source: (The European Central Bank, 2014, p. 6)

Figure 4 present the results from the ECB BLS, showing that cost of funding and balance sheet constraints had a tightening impact on standards before and right after the implementation of Basel III. It is not enough evidence to assume the sole reason is preparing to meet the first capital requirements, but it could be a contributing factor assuming the theory discussed in section 3.1 and 3.2 holds.

Thomas F. Cosimano and Dalia S. Hakura (2011) tried to calculate and predict bank behavior in response to Basel III. Their paper considered the 100 largest banks and bank holding companies (BHCs), and examined the country-to-country variation based on commercial banks and BHCs in advanced economies, categorized in (i) economies that experienced the banking crisis and (ii) economies that did not experience the banking crisis (Cosimano & Hakura, 2011, p. 4).

They assumed that an increase in future marginal cost of loans implied that banks approved less loans to eliminate the need for new equity. The major finding in their paper was that an increase in equity to asset ratio of 1.3 percentage points[40] would increase the loan rate by 16 basis points (bps) for the 100 largest banks and BHCs. This implied an upper limit of 0.12 % higher return on equity relative to marginal cost of deposits, which is in contradiction to the MM theorem. The reason can be the too-big-to-fail mentality in compliance with Vale (2011). In times of

[40] Calculation done by Kashyap, Stein and Hanson (2010) based on increased spread in lending to achieve the minimum capital requirements under the Basel III framework. Other calculations predict higher increased spread in lending, but this paper uses 1, 3 percentage points.

excess credit growth, when the countercyclical buffer is added, the equity to asset ratio goes up by 2.5 percentage points, which led to loan rates increasing by 31 bps, based on their calculations (Cosimano & Hakura, 2011, p. 5).

The 1.3 percentage point increase in equity to asset ratio also caused a reduction in loans by 1.3% (2.5% if the countercyclical buffer is imposed). For the country-to-country analysis the supply of loans in the long run would on average decrease with 4.6% for countries affected by the banking crisis, and 14.8% for the countries not affected by the banking crisis[41] (Cosimano & Hakura, 2011, pp. 6-7).

The paper also found that small changes in lending interest rates opened the door for regulatory arbitrage opportunities, and a shift from traditional banking towards shadow- banking as we saw ahead of the 2007-2009 financial crisis (Cosimano & Hakura, 2011, p. 21). This supports findings in Jackson et al. (1999), when evaluating the impact of the Basel Accord.

4.7 Concluding Remarks

As mentioned introductory, the effects of the Basel III framework is hard to determine, and as this section has shown, there are no definitive answer. How banks adapt to the new regulations is dependent on several factors. The theory presents possible outcomes, but the theories are based on stylized examples and the empirical evidence can not say if what we see has a causal connection to the implementation of the Basel regulation. In addition, economists disagree about the possibility and extent the alternative effects might have.

Despite of the uncertainty it seems, as in compliance with Furfine (2000), the capital requirements change the incentives of banks, and hence bank behavior. A likely conclusion in relation to capital requirements is that the way banks choose to react is dependent on the initial position of the bank[42]. If the bank is far below the required capital level it is reasonable to assume that a likely outcome is higher interest rates on loans and a reduction in credit in compliance with the bank lending channel theory, but to what extent is hard to say. The implications for SMEs and entrepreneurs will be thoroughly discussed in the analysis in Section 6.2. Assuming a reduction in lending will affect these type of companies more than larger companies due to the higher risk weights they attract is a reasonable conclusion.

[41] The calculation assumes an average demand elasticity of -0.33 for the 100 largest banks. Second, there is a big variation between the countries in the different categories.

[42] Regarding current capital adequacy and liquidity.

The interpretation of effects caused by the liquidity requirement is ambivalent. Empirical evidence suggests it will have little effect on bank lending and interests to households and non-financial companies. In contradiction, the Basel assessment suggests restructuring the balance sheet towards more high quality assets with lower yield payments and expensive funding, which reduces returns. It is definitely possible that banks increase interest spreads to maintain profitability. In addition, as mentioned, a reduction in other assets might be required to meet the regulative standards, which again leads back to the assumption that SME will be more affected.

5. Small and Medium Sized Enterprises and Entrepreneurs

This section will first define small and medium sized enterprises, entrepreneurs and the importance of these types of companies for the economy. Second, I will look at the financial structure of these companies, their possible sources of funding and potential problems regarding acquiring funding.

Small and Medium Sized Enterprises (SMEs)

There is no universal definition of SMEs. For different countries and different purposes, the definition changes. A general notion is though a non-subsidiary company who employs less than a given number of employees. The limit of employees to be considered an SME also differ from country to country (e.g. 250 in EU and 500 in The US). An alternative definition is based on revenues and financial assets (as in the Basel regulations) (ABD and OECD, 2014, p. 380). In this paper, the focus is on SMEs involved in innovation and R&D, owing to the fact that they have a higher growth potential relative to other types of SMEs, such as the local kiosk. Because empirical studies are based on different definitions of SMEs, the general definition of SMEs in this paper will be: relatively young enterprises with limited revenues and number of employees[43]. Empirical studies do not necessarily differentiate between SMEs with high intensity of innovation, which makes it hard to isolate my focus group of SMEs. However, the analysis in section 6.2 will address SMEs invested in innovation.

Entrepreneurs

There is no standard criteria for defining entrepreneurs. For the purpose of this paper, I define entrepreneurs as individuals with innovating ideas who start up a sole proprietorship or an SME to develop and sell their ideas, or products of their ideas.

5.1 Capital Structure of SMEs and Entrepreneurs

Capital structure is somewhat correlated with the location of the SME or entrepreneur, mainly because of these factors: Market structure and conditions differ between countries, which makes the combination of capital dependent on the possible options and access of capital in the operating county. A second aspect is that variation in economic cycles and economic situations in the operating country will affect the access to credit and thus the capital structure. There is

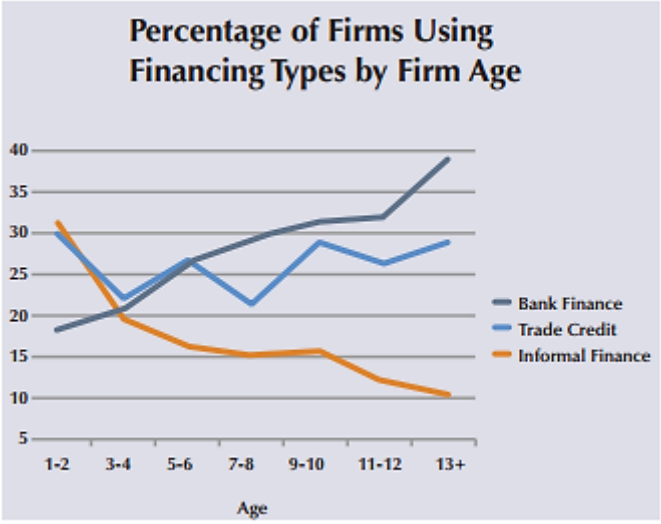
[43] One would expect a small company involved in innovation to be relatively young and have limited generation of revenues in the startup phase.

also a big controversy in empirical studies of capital structure of innovation companies and SMEs and little research on the structure in innovative SMEs.

This section provides examples from empirical studies of capital structure for either SMEs or innovation intensive enterprises, with the objective to find common denominators.

Chavis, Klapper and Love (2010) used the IMF enterprise survey to analyze differences in entrepreneurial finance. They used the age of the company to differentiate. Assuming innovative SMEs and entrepreneurs are relatively young, they found that younger firms relied less on bank financing in favor of alternative sources of funding. As presented in Figure 5 below, the use of informal funding decreased with the age of the company. The complete opposite is observable for bank lending. Despite this, they found that young firms had better access to bank finance than older firms, in countries with strong rule of law and better credit information and that the use of alternative funding decreased with the availability of credit information (Chavis, et al., 2010, pp. 1-2). Suggesting that a reason for young firms turning to alternative funding is related to asymmetric information.

Figure 5: Types of Financing Based on Firm Age



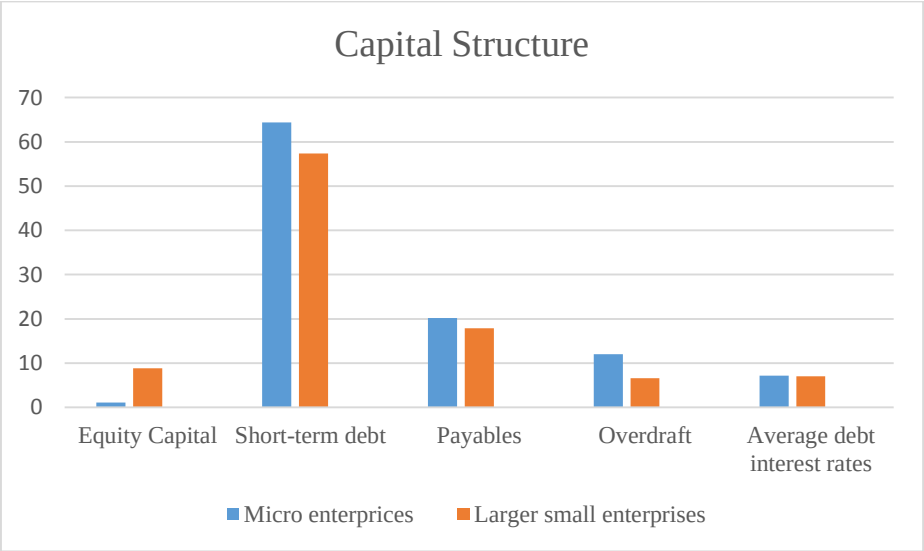
Source: (Chavis, et al., 2010, p. 2)

Kuntchev, Ramalho, Rodríguez-Meza, Yang (2014) used the enterprise surveys to look at SMEs' access to credit. First, they found that SMEs were more likely to be credit constrained and that the probability of being constrained decreased with firm size (Kuntchev, et al., 2014, p. 3). Second, they looked at the sources of funding used dependent on firm size. For the second aspect, they found that for financing both working capital and investments, bank and non-bank financial institutions was the main source of funding, but the use decreased with size. For the

use of alternative[44] external sources of funding, there were regional differences. With some exceptions, the common feature is that use of other financing sources decreased with size, implying that smaller companies are more dependent on alternative sources of funding. The use of equity to fund investments varied with respect to region, but in most regions, dependence on equity was higher for smaller companies (Chavis, et al., 2010, pp. 34-35).

Kvinge (1997) studied the capital structure of small Norwegian industry enterprises. She found that savings and mortgages were in general the most important sources of funding for small entities in Norway, and that none of the sample entities reported using the bond market or issued new equity. Government funding was limited to the largest of the sample entities, probably due to lack of resources and risk assessments. From a sample of 427 micro- and small enterprises, she found the capital structure presented in Figure 6 (Kvinge, 1997, pp. 14-15).

Figure 6: Capital Structure for Micro- and Small Enterprises



*In percent, as potion of total capital, for businesses with up to 50 employees. Source: based on table from (Kvinge, 1997, p. 14).

Short-term debt constituted the largest percentage of total capital, while equity was a small share. In addition, she found that the capital structure of companies with funding problems were similar to the structure of the micro- and small enterprises (i.e. high leverage ratio) and that they attracted higher interest rates on debt.

[44] Alternative sources of funding is in the paper divided into categories, trade capital (e.g. supplier and customer credit), equity capital (including both present and new shareholders) and other external funding (e.g. loans form friends, family and moneylenders).

Sharma (2007) found trends implying that companies engaged in innovation used more bank financing. His research shows that compared to other firms, innovative companies had higher investments from banks and government funds. However, he found no significant implication of innovation affecting the use of equity capital. The patterns held for both large and small firms, implicating that capital structure is independent of firm size. On the other hand, his data insinuates that small firms face larger financial obstacles (Sharma, 2007, pp. 7-8). Based on this, it is fair to assume that small innovative firms are highly dependent on bank lending, but struggles with gaining access to credit. Another of Sharma's conclusions supports this assumption; financial development is vital for allocation of capital to innovative SMEs (Sharma, 2007, p. 16). Thus, innovative SMEs' access to capital is dependent on the economic situation because they depend on bank lending, which is procyclical.

Aghion, Klemm, Bond and Marineschu (2004) performed a study of financial structure of UK companies involved in innovation and R&D. They found that companies involved in innovation used more debt as source of funding, but that the use decreased when innovation intensity increased. The share of unsecured debt was also higher for companies in R&D. The sample companies with highest intensity of innovation were most likely to use equity as a funding source and reliance on issuing equity increases with innovation intensity (Aghion, et al., 2004, pp. 277, 282-283). They tried to explain their findings with the fact that more innovative firms have more appealing investment opportunities, and hence are more reliant on external funding, but that they due to control rights would prefer debt (Aghion, et al., 2004, pp. 284-285).

Bartoloni (2011) found that leverage decreased with profitability and alternative internal funding (i.e. retained earnings and equity capital) (Bartoloni, 2011, pp. 3-5, 12, 17), which implies dependence on external funding in the startup phase. Investing in intangible assets such as innovation decreases leverage, because successful innovation enhance self-funding through internal finances. Starting up an innovative company does not generate economic returns for a long time, making them dependent on external funding. Her study found that innovative SMEs relied more on internal funding and short-term debt than larger companies did (Bartoloni, 2011, p. 34) . Thus, getting involved in innovation has less impact on capital structure for SMEs than larger firms.

5.2 Sources of Funding

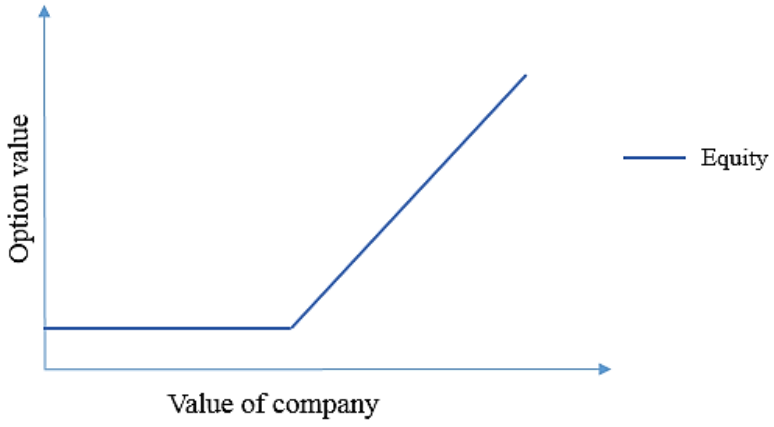
The credit side of the balance sheet is constituted of equity and various forms of debt. The credit side will fund the debit side in the balance sheet, thus the credit side represent sources of

financing. This subsection seeks to present possible sources of funding for SMEs and entrepreneurs and possible obstacles with acquiring funds from these sources. There are many possible sources. I chose to focus on the key sources relevant for this paper: equity, debt, venture capital and government programs. It should nevertheless be mentioned that loans from friends and family and trade credit plays an important role in funding innovative startups (SMEs) and entrepreneurs.

5.2.1 Equity

Common stock, often referred to as equity, represents the ownership share in a company. The stockholders' return is based on the performance of the company. Equity investors receive dividends based on retained earnings. Common stock have two important characteristics; (i) residual claim and (ii) limited liabilities. Residual claim means that the stakeholders are the last in line in claiming assets and income in cases of default bankruptcies, while limited liabilities implies that most investors can not lose more than their original investment in case of failure[45] (Bodie, et al., 2014, pp. 4,42). Because of limited liabilities, shareholders can be viewed as having a call option on the company. Structured as in Figure 7 below, the kink in the curve represents the amount of debt equal to the value of the company. With increased company value, the value of the shares increase, whereas for company value lower than debt value, the company has to hand over assets to repay debt, but the shareholders will only lose their original investment (Bodie, et al., 2014, p. 707).

Figure 7: Equity as a Call Option



Source: (Bodie, et al., 2014, p. 707)

Equity is a composition of paid-in capital and retained earnings. In the startup phase, owners must invest equity in the company, thus attracting risk. Retained earnings are returns reinvested

[45] Not the case for unincorporated companies where creditors can claim personal assets in case of failure.

in the company. Hall (2002) found that retained earnings is a preferred funding source for innovative firms because it is less costly than issuing new equity (Hall, 2002, p. 13). To be able to use retained earnings imply that the company already have revenue generating activities, which removes it as an option for funding for startups and entrepreneurs.

The alternative to existing equity is issuing new shares, implying acquiring new capital in the equity market. The consequence of share issuing is more capital, but a dilution of existing shares.

As discussed for banks issuing equity for the purpose of increasing capital ratio, there are issues with accessing the equity market. As in the banking sector, the presence of asymmetric information is a problem in financing innovation companies. An entrepreneur usually has better information about their project idea and the likelihood of success than investors do. Therefore, the market for innovation investment is a "lemons" market.

Asymmetric information is especially present in research, development, and innovation. The idea is the base for the entire company and so reducing information asymmetry via fuller disclosure is not an option in this arena, due to the ease of imitation of inventive ideas. Firms are reluctant to reveal their ideas, because there could be considerable costs related to revealing information to their competitors. Hence, the insinuation of asymmetric information combined with the possible costs of reducing the problem, is that innovative firms and entrepreneurs will face higher cost of external capital due to the lemons problem (Hall, 2002, pp. 7-9)

Another issue surfacing when issuing equity is moral hazard. Separation of ownership and management leads to a possible principal-agent problem, where the goals of the owner (investors) differ from the goals of the manager (entrepreneur). Investors seek to maximize their investment, while the entrepreneurs might have other visions for their idea that do not necessary maximize shareholder value. Differences in willingness to attract risk is another problem. Innovation investment is generally risky because no one knows how the market will react to the new products, and there might not even be a market yet.

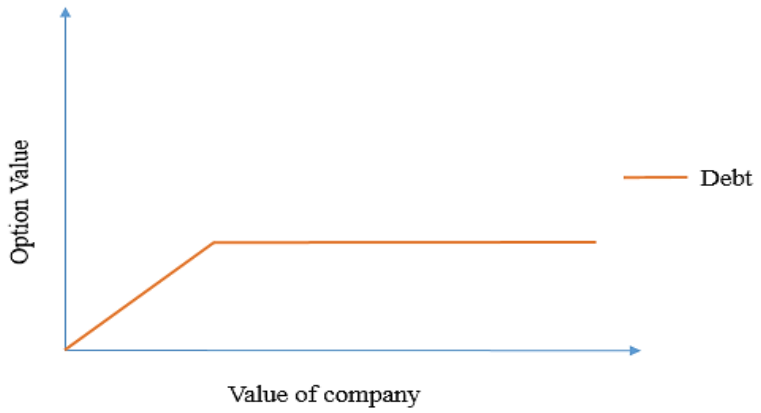
Entrepreneurs might be more willing to take risks to realize their ideas, whereas investors are more concerned with getting returns on their investments. Although moral hazard problems occur in non-innovative companies as well, in case of investing in entrepreneurs and innovative SMEs investors have a capitalistic view, while idea holder might see other gains as more important (Hall, 2002, pp. 9-11).

5.2.2 Debt

Debt is external capital borrowed over a period of time under a set of conditions and requirements for return i.e. interest rates. Debt comes in different forms. Most common is bank financing through a loan. Banks provide loans with different maturity and restrictions dependent on the borrower. Another debt form is money market debt or debt securities e.g. various versions of corporate bonds, which is a loan directly from the public (Bodie, et al., 2014, p. 39).

In the same manner as equity, debt can be viewed as a put option, see Figure 8. The kink in the debt curve represents the value of the debt as part of the company value. The debt holder will not receive more returns than the value of the debt plus interest, but in contradiction to equity there is a downside risk. The downside risk represent the case when company value falls below debt value. In such a case, the lenders will not reclaim the outstanding claim.

Figure 8: Debt as a Put Option



Source: (Bodie, et al., 2014, p. 707)

Debt owners usually do not have voting rights like equity holders, which make them less able to influence the decision-making of the company. Thus, creditors often require collateral. Banks and debt holders prefer to use physical assets to secure loans because of the downside risk, which makes them reluctant to invest in innovative projects with intangible assets, such as human capital and knowledge. In addition, research have found that the sunk cost associated with innovation is higher than other investments (Hall, 2002, pp. 13-14). This supports the findings of Chavis, Klepper and Love (2010), who found that too high collateral requirements was one of the reasons for not applying for a bank loan, and for younger firms the main source of collateral was the owners' personal assets (Chavis, et al., 2010, p. 3).

Servicing debt normally requires a stable generation of cash flow, which in case of innovative projects is not necessarily available in the early stages of the process. Even though the problems of asymmetric information and moral hazard are present in both bank lending and money market resulting in higher required rate of return and collateral, revealing information to a bank does not have the same risk of imitation by competitors. The probability of a bank stealing or copying an innovative idea is close to zero, thus the asymmetric information problem is smaller in bank funding and more related to the banks' lack of knowledge about the industry or innovation product.

5.2.3 Government Funding and Venture Capital

Government authorities realize the importance of new and innovative firms, thus they have created government-funding programs e.g. Small Business Investment Company (US) and Innovation Norway. The purpose of these programs is to allocate funds to SMEs involved in innovation and high technology, and function as guarantors for loans to small businesses. Lerner (1999) found significantly higher growth for SMEs in the Small Business Innovation Research program than similar companies outside the program (Hall, 2002, p. 24). An explanation is that the government involvement functions as a verification of the firms' quality, thus they are able to access additional funds from private sources.

The Venture capital market is often viewed as the solution to the void in innovation financing or the free market solution to the problem of financing innovation (Hall, 2002, p. 23). The structures of these companies differ on a country-to-country basis. Venture capital is seed capital, thus an equity investment. Usually it consists of pools of funds from private investors, which are managed and invested in by individuals with knowledge about the industry. The theoretical background is based on investors being knowledgeable about the investments and the industry, thereby reducing the lemons problem. An upside of venture capital is that the venture capitalists can contribute to the company with competence and active ownership, which in turn reduces moral hazard. It is a hands-on investment form, giving the investors better knowledge and influence on the decision-making and development of the company in contradiction to bank lending.

The downside is that venture capital funding tends to be procyclical, but it is hard to determine whether the supply of funding causes growth or growth encourages funding. Consequently, in times of credit crunches and the need for alternative credit is highest, access to venture capital is also reduced (Hall, 2002, p. 24). In addition, as mentioned in the background section, use of venture capital geographically limited. Access to this kind of capital tend to be clustered in

areas e.g. Silicon Valley, which limits the number of companies with access to this form of funding.

5.3 Concluding Remarks

Modigliani and Miller's theorem (1958) states that capital structure is irrelevant for funding costs, which then turns out not to be the case. Innovative SMEs and entrepreneurs using equity as their main source of funding are more profitable and experience a higher growth, which implies that the choice of funding is sensitive to the expected rate of return. That is, investors supplying funds for these types of companies require higher returns to compensate for the risk of a "lemon", which makes it a more expensive source of funding (Hall, 2002, pp. 13-14).

Empirical studies on capital structure for SMEs, entrepreneurs and innovation suggests that these companies rely more on alternative funding compared to other companies. Despite that fact, bank lending is their major source of funding. The relatively more intense use of alternative funding might be related to the costs of and access to standard funding sources. The presence of either asymmetric information or principal-agent problems imply that new debt or equity finance will be relatively more expensive for innovative SMEs and entrepreneurs. The problem with asymmetric information is bigger in equity financing due to unwillingness to share information in fear of imitation, but risk perception about the industry due to lack of knowledge contributes to stricter credit standards in bank lending[46]. In addition, other considerations, such as lack of collateral, further reduce the possibility of debt finance.

Possible reasons for the observed capital structure is that the construction of taxation and size of asymmetric information problems indeed are favoring debt. Interest rate expenses are tax-deductible, while dividend payments are not. In combination with a smaller risk of imitation related to revealing information to a bank, which reduces the asymmetric information problem and thus the required rate of return, debt seems like a cheaper funding option. This theory is supported by Aurebach (1984), who finds that due to taxation, the cost of financing new investments through debt is cheaper than by retained earnings, which is again cheaper than issuing new shares (Hall, 2002, pp. 13-14) .

[46] Figure 4.

6. Analysis

This section of the paper seeks to address the main issues of the paper: How will the impacts of Basel III on bank lending affect SMEs and entrepreneurs' access to funding? And second, How will these changes effect expected economic growth?

As discussed previously, there are many sources of funding for innovative SMEs and entrepreneurs, but there are also several difficulties with gaining access to funding from these sources. In addition, bank lending is a key source of funding, implying access to bank credit is essential for the development and survival of innovative SMEs and entrepreneurs. Hence, the issue to be analyzed further is how the Basel III regulations will affect the access to bank- and financial institution credit for SMEs and entrepreneurs and second, how this will impact the potential for economic growth.

6.1 Current Situation and Recent Development in SME Lending and Credit Conditions

Economic growth came to a halt in 2012 after a slight recovery. After the financial crisis of 2007-2009, the world economies fell into a recession in 2011-2012. Both inflationary pressure and demand fell (OECD, 2014, pp. 28-29). SMEs experienced a double shock: (i) a credit crunch and (ii) a fall in demand for their goods. Studies on SME finances in the period of 2007-2011 suggest a degeneration in the financial situation for SMEs in most countries. While there has been a recovery to some extent, the levels are far beyond pre-crisis levels. In addition, implementation of Basel III was expected to have a significant impact on SME lending and credit conditions (ABD and OECD, 2014, pp. 14-21).

The recovery in both economic growth and lending to SMEs varies widely across countries. The Euro area is considered particularly unstable due to weakly capitalized banks, public debt financing requirements and exit risks. The monetary easing in response to the financial crisis did not have the wanted effects. The flow of credit to the private sector remained low. Concerns about public debt pushed yields on government bonds up. In addition, many corporate bonds and loans will fall due in 2013 and 2014, causing the increased supply to put an upward pressure on corporate bond yield. This indirectly increase cost of bank loans, because it resulted in increased cost of funding for banks, which they shared with the customers through increased interests (Angelkort & Stuwe, 2011, pp. 17-19). Banks holding sovereign bonds form high debt counties in their balance sheets experienced refinancing difficulties. In addition, a deterioration of balance sheet positions due to the distressed financial environment and increasing credit

losses lowered the banks capacity and willingness to provide credit to the private sector (OECD, 2014, pp. 28-29). These effects comply with the procyclical effect banks tend to have.

The observations from the credit supply side comply with the observations on the demand side. Survey findings by ECB and OECD suggests a further supply restriction in the provisions of loans made 15% of SMEs that applied for a loan in 2011-2012, got their application rejected, which is the highest since late 2009. The response suggested some cases of increased interest rates, but the major obstacle was increased demand for collateral. The availability improved in 2012, implying improvement in financial market confidence and in banks' funding conditions. The problems lasted longer in Europe, where one third of SMEs did not get the full funding they were planning on, and worsened conditions in 2013 (OECD, 2014, pp. 38-39).

6.1.1 Changes in SMEs Access to Funding

As mentioned in the previous section, SMEs have limited choices when it comes to forms of financing. SMEs are more dependent on debt financing than larger firms. The narrow set of financing sources makes them more vulnerable to changing conditions in credit markets. A decline in SME loans implies that the credit market allocated a smaller share of funding to SMEs. However, this can also be a result of changing trends in financing opportunities for larger firms. Hence, the observed trends can reflect a general contraction in bank lending indicating that larger firms are resorting to other forms of finance. The same can be applied to the opposite case. An increase in SME lending can be due to an increase in total volume, implying no change in the share of SMEs relative to larger firms. Figure 9 shows that SMEs make up more than 90% of total enterprises in both the OECD and ABD area, which makes it reasonable to conclude that the lower share of SME loans to total loans can not be explained by number of SMEs to larger companies. On the other hand, it also implies that the access to bank lending has been more limited for SMEs than larger firms.

To get a representative picture of the development in lending behavior towards SMEs, one have to compare the shares of SME lending relative to larger enterprises *and* the change in total lending volume (OECD, 2014, pp. 30-34). During 2007-2011, SME loans as share of total business loans increased in only four countries of the OECD scoreboard countries. This continued to be the case even in regions with positive SME loan growth, implying that total business loans were growing faster, increasing the gap in SME financing in many economies. Only a few economies reported an accelerated growth in SME financing, but these economies also had a growth in GDP, suggesting that to some extent the increased gap in SME financing

is correlated with the economic distress caused by the financial crisis (ABD and OECD, 2014, pp. 14-21).

6.1.2 Changes in Credit Terms

In most countries, the credit terms applied to SMEs were less favorable than for larger companies i.e. higher interest rates, shorter maturity and stricter requirements for collateral. Even countries experiencing improvement in SME lending experienced a tightening of credit conditions. It should be noted that the changes in conditions are complex to compare due to geographical differences.

The tightening of collateral requirements was observed not only in SME lending, but also in other markets i.e. haircuts on securities in the financial sector. Thus, the tightening applied to SMEs in isolation cannot explain if the increased credit standards are related to risk evaluation of SMEs, or a general increased perception of risk. Thus, credit standards has to be measured in relative terms. With some exceptions, the majority of SMEs were required to provide increased collateral to back their loans. The increase was mostly unified across country borders between 2010 and 2012. An explanation may be the decrease in value of the underlying assets used as collateral. With a decrease in asset value, increased requirements are reasonable to keep the collateral coverage intact (OECD, 2014, pp. 36-37).

After a slight ease in 2010, the conditions were tightened in 2011 because of increased awareness of credit risk associated with loans (ABD and OECD, 2014, pp. 14-21). However, the availability to funding seems more relevant to SMEs than the cost of funding. The OECD scoreboard (2014) finds that the perception of access to funding was worsened in 2011 and 2012, leading to the assumption that there were cash flow constraints (OECD, 2014, pp. 36-37). In contradiction, IFO (2011) reports that 24% of enterprises complain about restricted lending, which is amongst the lowest percentage since this statistic began to be recorded – implying there was no bottleneck in business lending. Angelkort and Stuwe (2011) states that during and after the crisis, decentralized credit institutions were able to ensure stability in SME financing (Angelkort & Stuwe, 2011, pp. 17-19).

Despite a downward trend in interests due to quantitative easing in 2011, an increase in nominal interest rates charged to SMEs insinuate an upward trend in cost of funding for SMEs. In some countries, the increase in nominal interests resulted from the precarious situation regarding government debt. In half of the countries studied in the OECD scoreboard, the increase in nominal interests was complemented with a remarkable increase in interest spreads between

loans for SMEs and large companies implying a deteriorated perception of risk associated with SME lending (ABD and OECD, 2014, pp. 14-21).

6.1.3 Changes in Access to Equity Capital

The financial crisis also affected the market for equity capital, resulting in an acute decline in venture and growth capital in 2008-2009, supporting the procyclical behavior of venture capitalists. The recovery varied from country to country, but a large number of the sample countries[47] averaged around 5% of total financing. Consequently suggesting that the precarious economic climate functioned as a damper on equity investment (ABD and OECD, 2014, pp. 14-21). Despite this reality, public and private co-investments in venture capital programs and government funding and regulatory changes have had positive effects on stimulating equity investments in many countries during and after the financial crisis (OECD, 2014, pp. 39-40).

6.1.4 Changes in Trends 2013

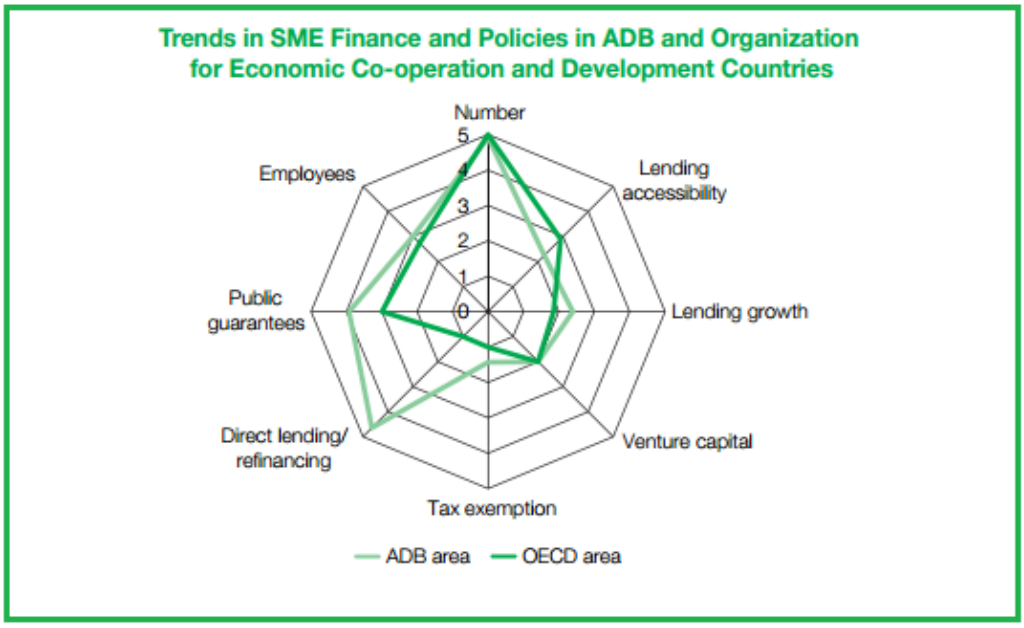
As Figure 9 shows figures form 2013. There were some differences in both trends and policies between the OECD and ADB[48]. With regards to bank lending, the share of SME loans was 30%-40% for the OECD and a bit lower for ADB. The annual growth in loans to SMEs ranged between zero and 10%, which indicates a modest growth. These findings are albeit consistent with the OECD Scoreboard (2014), but the scoreboard takes into account that the growth is stronger in countries who did not experience a credit contradiction in 2007-2009, while the growth is negative in the countries that where hit the hardest. Invested growth and venture capital has marginally increased since 2007. The biggest regional differences are observed in relation to policy responses. The share of countries with direct lending and refinancing schemes, was less than 30% for OECD, while 90%-100% for the ADB area. The share of countries with public guarantee schemes in OECD was 50%-70%, while 70%-90% for the ABD. The differences in these indicators emphasize the problem with comparing effects across country borders, infrastructural differences in capital markets and access to alternative funding. Even though invested venture capital seems to be similar, the government involvement has significant impact on access to alternative funding. When it comes to tax incentive schemes, less than 30%

[47] From the OECD and ADB study.

[48] ABD= 14 developing member countries of Asian Development Bank: Bangladesh, Cambodia, People's Republic of China, India, Indonesia, Kazakhstan, Republic of Korea, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, Sri Lanka, Thailand and Viet Nam.

of the OECD counties had such schemes for SMEs. In the ADB area, the same share was 30%-50%.

Figure 9: Trends in SME Finance and Policies in ADB and OECD (2013)*



Scale		5	4	3	2	1
A. SME Landscape						
Number	Share of SMEs to total number of enterprises	more than 90%	70–90%	60–70%	50–60%	less than 50%
Employees	Share of SME employees to total number of employees	more than 90%	70–90%	60–70%	50–60%	less than 50%
B. Bank Lending						
Accessibility	SME loans share to total loans	more than 50%	40–50%	30–40%	20–30%	less than 20%
Lending growth	Annual growth, latest year	more than 30%	20–30%	10–20%	0–10%	negative
C. Venture and Growth Capital Invested						
Venture capital	Relative to 2007 (2007 = 1)	more than 2.5	2.0–2.5	1.5–2.0	1.0–1.5	less than 1.0
D. Policy Responses						
Direct lending/ refinancing	Share of countries with direct lending and refinancing scheme(s)	90–100%	70–90%	50–70%	30–50%	less than 30%
Public guarantees	Share of countries with public credit guarantee scheme(s)	90–100%	70–90%	50–70%	30–50%	less than 30%
Tax exemption	Share of countries with tax incentive schemes for SMEs	90–100%	70–90%	50–70%	30–50%	less than 30%

*Based on data from ABD Asia SME Finance Monitor 2013 and the OECD Scoreboard 2013.
Source: (ABD and OECD, 2014, p. 22)

6.2 What to Expect for SME Lending and Credit Conditions After the Implementation of Basel III

In an economic upturn, the dependence on bank loans has not been as significant of an issue for SMEs and entrepreneurs. However, due to struggles with recovering to pre-crisis economic growth levels and debt consolidation, the volumes are not expected to bounce back to pre-crisis levels in the near future. Based on the empirical results and discussions in section 6.1, it is reasonable to conclude that SMEs and entrepreneurs access to bank lending and the credit conditions applied to their loans is correlated with the economic situation. Since it has already been made clear that bank lending is procyclical, this conclusion is quite obvious. The interesting part is that it seems that banks' procyclical behavior affects lending to SMEs and entrepreneurs to a wider extent than larger firms.

A probable cause is the perception of risk associated with innovative SMEs and entrepreneurs. As Figure 4 showed, the major factor for the credit standard tightening in 2012 and beginning of 2013 is the perceived risk. The evaluation of risk related to business cycles is not directly related to Basel III, but when calculating required regulatory capital, banks use the probability of default (PD) in IRB approaches to measure risk exposures. Underpinned by the results from OECD scoreboard (2014), the number of bankruptcies and delays in payments increased during and after the financial crisis (OECD, 2014, p. 1), due to a fall in demand for goods and a credit crunch, causing a reduction in cash flows.

The access to alternative funding also evaporated. Despite government involvement in reducing the repercussions, the buildup of government debt reduced their ability to provide guarantees and direct lending. In combination with the procyclical behavior of venture capitalists, it is reasonable to expect an increase in PD for SMEs and entrepreneurs. In a recession or a crisis, the lack of financing sources and fall in demand for goods, which reduces turnover, makes survival of innovative SMEs and entrepreneurs less likely than larger established firms. Banks apply interest premiums to reflect and protect themselves from the risk associated with the investment. With increased probability of default, a tightening of credit standard is expected. This is supported by calculations and observations of Cardone-Ripotella, Trujillo-Ponce and Briozzo (2011). They examine effects of Basel II and Basel III on required capital and risk premiums for SME lending. Their research is based on Spanish SMEs, and they found that the average PD from 2005-2007 was 3.07%, while it increased to 5.47% in 2008 and further to

7.55% in 2009[49] (Cardone-Riportella, et al., 2011, pp. 9-10). Consequently, there is an indirect relationship between the effects of Basel III and economic environment.

As described briefly in section 3.2 there are two approaches to measuring risk weights. The standard approach is done by an independent rating company, while the IRB approach is based on internal calculations of exposures to risk for different classes of assets. The IRB approach is more risk sensitive. Innovative SMEs and entrepreneurs tap in to new markets with no previous analysis of demand or probability of success. In addition, they do not generate cash flows immediately and (usually) have a predominance of intangible assets relative to real assets. All these factors imply that SME lending is a riskier investment than lending to an established, larger firm, thus it is reasonable to conclude that they have a higher PD than other enterprises. Although the PD increases in an economic recession or a crisis, the conclusion is independent of the economic environment. Inevitably, tighter credit standards are applied to SMEs and entrepreneurs, amplifying their financing difficulties through a raise in cost of funding.

In analyzing the pure regulatory effects of Basel III on capital requirements, I have disregarded the economic environment effects on PD for the first part of the analysis.

6.2.1 Effects of Increased Required Regulatory Capital

The IRB approach is not a new method in Basel III, but the stricter requirements for capital coverage and quality of regulatory capital changes the evaluation of the profitability of a loan. Cardone-Ripotella, Trujillo-Ponce and Briozzo (2011) calculated the changes in required regulatory capital due to the new requirements imposed by Basel III for Spain[50]. Their calculations take into account all new requirements i.e. increased minimum capital coverage, liquidity requirements and leverage ratio. They also include the firm size adjustment introduced in Basel II.

As mentioned, banks can either classify SMEs as corporate exposures or as part of a retail portfolio. The latter results in calculating exposures the same way as for other retail exposures or as part of a retail portfolio in compliance with the SME compromise, which will be discussed below. The firm size adjustment explained in section 3.2.1.1 has a positive effect for SMEs as long as their sales exceed €6 million. Exposure to SMEs is the sum of corporate or retail

[49] The numbers apply to Spanish companies, thus they are not representative for PD internationally, but the trend development reflect the changes in PD one expects to see in times of financial crisis.

[50] It should be noted that the numbers from the calculations apply only to Spain, but the trend development is applicable to a general interpretation of the effects Basel III have.

exposure and the firm size adjustment. As long as the sales exceed €6 million, the firm size adjustment is negative, thus reducing exposure. This is supported by Saurina and Trucharte (2004) who found that the firm-size adjustment reduced PD both for the standard and IRB approach (Cardone-Riportella, et al., 2011, p. 7).

In the case of Spain, the results of the calculations was that the required regulatory capital for SMEs as retail exposure was 3.925% and 7.36% for SMEs as corporate exposure under Basel II. Under Basel III the exposures increased to 5.153% and 9.66%[51] respectively (Cardone-Riportella, et al., 2011, pp. 13-14). This development due to the regulative provisions imposed by Basel III suggest that lending to SMEs and entrepreneurs will be more expensive for banks, because Basel III requires higher levels of regulatory capital in comparison to the requirements under Basel II. Albeit under the assumption that equity capital is expensive and increased equity to debt ratio increases total cost of funding as equation (8) in section 4.1.2 suggests. This argument, in compliance with the discussed theory of the bank-lending channel, points to reduced lending to SMEs and entrepreneurs as a consequence of the Basel III provisions, but it is not necessary a fact.

The access to funding is indirectly affected by the cost of funding. The cost of funding determines if it is at all achievable to make use of a possible funding source. Due to asymmetric information, an external financier requires higher returns than one would require of one self. An outside party has less information about an individual's or a company's creditworthiness, therefore an additional premium to compensate for this bias in information is required. The asymmetric information related to innovative SMEs and entrepreneurs is discussed in both section 4 and 5, and in relation to bank lending one of the main problems is the lack of industry knowledge from the bank's side. In addition, uncertainty related to industry or economic development and future gives rise for a risk premium.

Cardone-Ripotella, Trujillo-Ponce and Briozzo (2011) calculates the changes in credit risk premiums (CRP) after implementation of Basel III. They calculate credit risk premiums as the sum of expected loss (EL) and opportunity cost of the regulatory capital. The inclusion of opportunity cost of regulatory capital is because in case of default the bank will not only experience losses related to the loan amount, but also the earnings they could have made on the equity capital by not tying it up. The bank could for example invest their equity capital in a less risky asset and get a safe return on their investment (ROE). Hence, the opportunity cost of

[51] See Appendix 6, Tables 11-14 for assumptions and more detailed calculations.

capital is the capital requirement (CR) * return on equity (ROE). Expected loss is by definition the product of PD and loss given default (LGD). Hence,

(10) $Credit\ risk\ premium = PD * LGD + CR * ROE$

(Cardone-Riportella, et al., 2011, p. 19)

The PD is dependent on the risk related to the borrower, which I have already determined is higher for innovative SMEs and entrepreneurs due to industry specific factors. The LGD is related to several factors including the lending volume. As discussed in previous sections, the CR is higher under Basel III. While Cardone-Ripotella, Trujillo-Ponce and Briozzo used a constant ROE equal to the average ROE in Spain (in 2011), one can argue that ROE is variable. The actual ROE is dependent on the profitability of the bank, while required ROE by shareholders is dependent on their perception of risk related to the bank. Assumingly a higher equity to debt ratio reduces the required return on equity because the volatility of equity is reduced and the financial structure is less risky, in compliance with Vale (2011). Shareholders are the last in line for collecting their investment in case of default or bankruptcy, thus a bank with high leverage would expect the equity holders to require a higher return on their investment. The increased requirements for capital could therefor reduce ROE and in second turn, this would reduce the credit risk premium.

The calculations of CRP for Spain are presented in Table 15 in Appendix 6 and shows that the CRP is higher under Basel III than Basel II. The discussion in the previous section suggests not only that the CRP will be higher for SMEs than larger firms, but also that due to the increase in CR; Basel III contribute to an increase in CPR in general (Cardone-Riportella, et al., 2011, pp. 18-19). However, because the PD for SMEs and entrepreneurs is higher than for larger enterprises the CRP applied to SMEs and entrepreneurs is expected to be higher, see equation (10).

For Banks, their current level of regulatory capital limits the growth of lending if new capital is not acquired, because expanding the balance sheet with new loans requires regulatory capital coverage. As discussed, Basel III results in increased required regulatory capital, which implies that even given an unchanged balance sheet, a bank might have to raise new capital. The price of new capital and frictions in equity capital markets will to some extent limit the accessibility to acquire new regulatory capital. In addition, assuming the calculations by Vale (2011) holds, the cost of funding for banks will increase. Theory for the bank-lending channel suggests that the effect will be a reduction in lending. Given that lending to SMEs and entrepreneurs presents

a larger exposure to risk and thus requires more regulatory capital, which entails an acquisition costs, it is reasonable to assume that SME lending will be reduced relative to lending to larger firms.

Another aspect to consider is the size of banks. Large banks are often considered too big to fail which makes it easier to use the equity capital markets. The frictions in this market described in section 4.2.1 are more limited for large banks, because the government indirectly guarantees them. The government guarantee reduces the asymmetric information problem and the probability of investors losing their invested capital, hence they are more willing to invest and require lower returns on their investment. In the case of issuing new equity, the required return on capital is higher for the intermediary banks such as saving banks, cooperative banks and private bankers. These banks are usually those who concentrate on SME and entrepreneur financing. These banks have to cover increased capital requirements in the first instance through retained earnings (Angelkort & Stuwe, 2011, p. 11). This has a negative impact on SMEs and entrepreneurs because banks with high engagement in SME and entrepreneur lending face a higher cost of funding through the equity market. Their dependency on retained earnings and relatively higher costs of addressing the equity capital market limits access to regulatory capital, thus the increase in capital requirement presents a bottleneck in SME and entrepreneur lending.

The alternative to acquiring new capital is to change the balance sheet, either its size or structure. The changes in Basel III related to risk assessments of trading book positions and securitizations seem to be in favor of SMEs and entrepreneurs, because provisions for the risk-weights applied to corporate loans did not change, while exposures to more innovative instruments, such as trading book assets and securitizations did. This means that even though SMEs and entrepreneurs attract higher risk weights relative to larger firms, they are theoretically preferable in relation to trading book positions and securitizations for the purpose of reducing total balance sheet risk exposure (Angelkort & Stuwe, 2011, pp. 15-17). Whether banks in reality would prefer SME and entrepreneur loans or trading book positions and securitizations is albeit another case.

The SME compromise requires a 6% backing of SME loans in the retail portfolio. The unchanged risk-weight measurements for corporations might be in favor of SME relative to trading book positions and securitizations. However, by only adjusting minimum capital and not the related risk weights, it causes an increase in the required backing for the SME loans in the portfolio, which implies a risk weight increase relative to that applied under Basel II

(Angelkort & Stuwe, 2011, pp. 12-13). This would reduce the intended purpose of the SME compromise. An increase in the risk weight applied to the portfolio and hence result in higher required regulatory capital leading to the same mechanisms discussed in the previous paragraphs.

Loans guaranteed by government programs or banks like Lending Guarantee Associations will under the Basel accords result in a reduction of the need of backing, relative to those collateralized by assets. That is, in case of a guarantor for SME and entrepreneur loans, such as the government programs provide, the risk weight applied to the SME and entrepreneur exposure is equal to the exposure to the guarantor. It is a fair to assume that the PD of the guarantor is lower than the borrowing SME and entrepreneur, because guarantors for innovative SMEs and entrepreneurs are usually governments, either directly or through government initiatives, and large associations. Thus the presence of a guarantors affects both the EL, required regulatory capital and CPR, but to what amount is dependent on the evaluation of PD and LGD for the guarantor. Cardone-Ripotella, Trujillo-Ponce and Briozzo's calculations support this. The CRP is still higher under Basel III than Basel II, suggesting a guarantor will reduce the cost of funding for SMEs and entrepreneurs, but that Basel III still imposes an increase in the CPR relative to the old provisions (Cardone-Riportella, et al., 2011, pp. 20-24).

Going back to the first paragraphs of this section, SMEs and entrepreneurs' access to funding is highly dependent on the economic environment. Basel III contributes to a stable financial market, hence a stable economic environment. The IRB approach uses the PD to calculate risk weights applied to the borrower, thus the required regulatory capital. As discussed the PD is perceived as higher for innovative SMEs and entrepreneurs, relative to larger firms. In general, a stable economic environment reduces PD, implying that a stable economic environment could contribute to ease of access to funding for SMEs and entrepreneurs.

Even though the capital conservation buffer and the countercyclical capital buffer increase the required regulatory capital, which seemingly has a negative effect on bank lending to SMEs and entrepreneurs, they contribute to less procyclical behavior from the banks. The banks will have to build up the buffers in good times, which implies less lending in good times. However, when the buffer is removed in bad times, banks have additional built up capital beyond the amount regulations require, contributing to sustain lending levels in times of distress. Consequently, this results in more stable access to funding for SMEs and entrepreneurs. A secondary effect of stable access to funding may be less defaults and bankruptcies in a recession

or a crisis. If the latter effect occurs, it would lead to a reduction in PD for SMEs and entrepreneurs, which implies reduction in required regulatory capital for these loans and a reduction in CRP applied to SMEs and entrepreneurs. This positive long-term effect is dependent on the buffer being predictable for the banks; otherwise, it would impose an additional risk element viewing the buffer as a shock for banks. On the other hand, predictability limits the supervisory government's flexibility to make decisions. Despite the governments' preferred flexibility, the regulations state that the buffer should be added in times of excessive credit growth; hence, banks can evaluate the market, leading to predictability to some extent.

In addition, Basel III seeks to improve the competitive conditions to achieve more equalized international competition. Figure 4 showed that competition is one of the major factors for the reduction in credit standards after the third quarter in 2012. One can not argue that the causal effect for the increased competition is Basel regulations. However, if Basel III evens out internationally competitive conditions, thus toughening the competition, the trend in Figure 4 might continue – easing the credit standards, also for SMEs and entrepreneurs.

6.2.2 The Effects of Liquidity Requirements

The banking industry has made several objections to the NSFR. The major argument is that the NSFR would require substantial and expensive changes to how they fund themselves and invest in assets, with little safety to be gained (Elliot, 2010). Following the ideal setup for adjustments to the liquidity regulations suggested by the Basel Committee in "An assesment of the long-term economic impact of stronger capital and liquidity requirements", that might be the case.

A bank holding high liquid assets (e.g. deposits and government bonds and –securities) could be viewed as liquid despite of funding with short-term maturities because assets could easily be liquidated to absorb a potential loss of funding. Banks holding less liquid assets rely more on long term funding, because the assets can not cover loss of funding as fast (Elliot, 2010). Thus, a bank does not necessary have to change their source of funding if they have high liquid assets. The downside is that high liquid assets are assets that can be converted fast and do not decrease in value in times of distress, usually such assets yields lower returns, putting pressure on margins and hence revenues (Angelkort & Stuwe, 2011, p. 9). To maintain their profitability, it is reasonable to argue that the banks seek profits other places, such as margins on loans. As discussed, SMEs and entrepreneurs attract higher risk premiums on their loans. An additional increase due to liquidity requirements imposed by Basel III suggests an increase in cost of funding in addition to the increase resulting from the capital requirements. This does not directly affect the access of funding in absolute terms, as a reduction in lending would, but the

ability to access funding is dependent on the cost. Thus, the liquidity requirements are not in favor of SMEs and entrepreneurs' access to funding.

If the banks has less liquid assets, they would then have to resort to more expensive stable funding, such as corporate deposits and non-bank and non-financial funding, the cost of funding increases. Increased cost of funding may translate into higher interest rates or reduction in lending in compliance with the bank-lending channel.

Another aspect is that in some cases, the restructuring of funding and substitution of assets might not be enough. If that is the case, the banks have to reduce their other assets. SME and entrepreneur loans are less liquid and more risky than other loans. The increased credit risk SMEs and entrepreneurs attract in times of financial or economic distress, reduces the loan value and investors willingness to buy them, thus they become less liquid. Other financial instruments might have higher risk, but compared to other loans it suggests a shift away from SME and entrepreneur lending. Whether a bank cuts back on SME and entrepreneur lending or other assets, such as trading book items and securitizations, depends on the preferred asset combination of the individual bank.

Regarding the "little safety to be gained" argument, it is more disputable. In case of panic due to financial distress with capital flight, a less liquid bank would have severe problems converting assets to cover loss of capital, which would make them illiquid or in a worst-case scenario insolvent (Elliot, 2010). This is exactly what was seen during the recent financial crisis. It was hard to differentiate illiquid banks form insolvent banks, in addition, the value of the assets decreased, further worsening the liquidity situation. These qualities made it harder to access funding in the interbank- and money market and resulted in a credit crunch. Consequently, banks are dependent on strict liquidity supervision and management to prevent a fatal run on the bank when confidence in their financial strength evaporates. The credit crunch could cause spillover effects to the banks' lending activities. If the banks can not access the inter-bank market, or are exposed to excessively high interest due to increase in liquidity- and credit risk, it would in compliance with the bank-lending channel lead to a reduction in lending.

Looking solely at the liquidity requirement, it might have the effects just discussed. However, it is worth noting that changing the HQLA to total assets by reducing short-term funding and increasing the amount of HQLA reduce RWA. A reduction in RWA causes synergy effects with regards to required regulatory capital. These spillover effects can have a positive impact on SME and entrepreneur lending, because a decrease in RWA reduces required regulatory

capital needed for current assets leaving room for expanding the balance sheet with for example SME and entrepreneur loans. However, if and what kind of assets the bank chooses to expand their balance sheets with, again depends on the bank's preferred balance sheet structure.

6.2.3 The Effects of Leverage Requirements

The purpose of imposing leverage requirements is to have a cross-check of the risk based approach. The leverage coverage is based on the amount of Tier 1 capital to the accounting balance sheet. It does not take in to account the riskiness of the balances sheet. This measure is to avoid the buildup of excessively large balance sheets. The leverage requirement is also disputed. First, because it is based on the accounting balance sheet and accounting regulations differ from country-to country. Hence, in reality, the measurement for leverage results in different coverage in different countries, which does not promote equal competition internationally. Second, the leverage requirements suggests a shift towards a smaller balance sheet, which means banks with large low risk balance sheets (as the capital requirements suggest) would have to hold more capital than banks with smaller high-risk balance sheets (Elliot, 2010). Taking into account both the capital and leverage requirements, banks would have to resort to less risky *and* smaller balance sheets, both suggesting a reduction in revenues.

The effect leverage requirements has on SMEs and entrepreneurs' access to lending is that the leverage requirement limits new business – unless new equity is issued. Expanding the balances sheet would require more Tier 1 capital. Since leverage does not take into account the risk, it does not differentiate SME and entrepreneur loans from other assets, thus leverage does not affect the access to funding for SMEs and entrepreneurs specifically, rather the total supply of credit.

On the other hand, a reduction in total lending suggests a reduction in total access to funding, including for SMEs and entrepreneurs. The possible decrease in revenues due to a reduction of the balance sheet diminishes the profit of the bank, which could result in higher interest rates to compensate for lower profits, the same way as for the liquidity requirements.

6.2.4 Effects on Alternative Funding

Venture capital is procyclical and government involvement is limited in times of a crisis, because of increased government spending to curb the scope of the repercussions. This is not optimal for SMEs and entrepreneurs, because it is in such times, when banks hold back on credit, they need alternative sources of funding. Basel III attempts to smooth the fluctuations in the economy, hence reducing volatility in supply of both venture capital and government

contribution. Consequently, Basel III provides the possibility of more stable alternative funding.

6.3 Effects on Economic Growth

The financial crisis of 2007-2009 caused a fall in GDP and reduced the forecasts for economic growth for most world economies, albeit to various extents. In addition, the path to recovery is an expensive process causing problems on its own, such as the European debt crisis. A crisis has major impacts on economic growth and future growth opportunities, thus a crisis presents a substantial cost with permanent losses for an economy. The purpose of Basel III is to reduce the probability of a new crisis through a stable and robust financial system. There are no disagreements on the fact that Basel III provides exactly that. Based on this view, the Basel III regulation promotes, if not economic growth at the current time, the possibility of economic growth in the future.

Recognizing the importance of financial stability, the secondary ramifications the Basel III regulations have on lending behavior might take the prospects of economic growth in another direction. Basel III will not reverse economic growth, but is expected to have a dampening effect on the pace of growth. Excessive growth is a contributing factor to a crisis, which is what Basel III is trying to reduce, but the question is how large of a reduction in growth is expected and acceptable.

The expected slowdown in economic growth is related to higher credit costs and reduced credit availability. How much one would expect the economies to contract is dependent on how much interest rates increase and availability is reduced. One could argue that the gradual implementation of Basel III provides a cushion for the effects one expects to see, discussed above. A gradual implementation gives banks time to adapt to the changes necessary. Intuitively that gives room for making small adjustments at a time, so that the effects are not as extensive as sudden large changes. The same thing is observed in monetary and fiscal policy cycle adjustments (not including measures taken during a crisis, the scope of such policy during a crisis have objective of wider repercussions). Countercyclical policy measures are small and contribute to reduce fluctuations in the economy without excessive impact on the real economy.

Figure 9 showed that in 2013, SMEs amounted more than 90% of all enterprises and employed 60%-70% of the total number of employees in both the OEDC and ADB area. This implies that SMEs and entrepreneurs are crucial to economic growth as they make up a large part of the economy. The innovative SMEs and entrepreneurs are also the contributors that have most

value to add. Mature firms and industries have limited possibilities of increasing GDP and employment. Albeit they contribute to economic growth, but unless they invest in research and innovation, they contribute little to expanding the opportunities for increasing growth, thus causing a shift in economic trend growth. The innovative SMEs and entrepreneurs' importance for economic growth could be and is disputed, but I will not discuss this further in this paper apart from mentioning that it is a factor one may consider.

As long as the shift in economic growth trend is caused by use of untapped resources or increased effectivity through innovation and not excessive credit growth, the probability of a new crisis does not increase. Growth stemming from unnatural growth in prices due excessive credit growth leads to the creation of bubbles, which are not backed by a real increase in value. When these bubbles burst gets a recession or crisis, depending on "size" on the bubble. On the other hand, use of untapped resources or increased effectivity through innovation cause a real value increase, thus does not present the same risk of a crisis. This is a reason why SMEs and entrepreneurs are so important to economic growth, in addition to job creation and generation of GDP.

The discussion in Section 6.2 suggests that Basel III will put more pressure on an already vulnerable situation, SMEs and entrepreneurs' access to financing. First, Basel III results in increased risk premiums to SMEs and entrepreneurs, thus increases their cost of funding. Second, access to funding seems to deteriorate through reduced lending. The presence of these effects will have a negative impact on economic growth, given that increase in growth is dependent on SMEs and entrepreneurs.

On the other hand, the fact that SMEs and entrepreneurs' access to funding is so dependent on the economic situation, and Basel III contributes to a more stable economic situation over time, speaks in favor of the effects being temporary. One would expect a stable economic environment to increase the SMEs and entrepreneurs' access to both bank lending and alternative funding, making it reasonable to argue that the effects on economic growth might be negative at present time, but in the future it will have less dampening effect and possibly even a positive effect.

7. Conclusion

SMEs and entrepreneurs' access to funding was already before the implementation of Basel III a problem in many economies. These enterprises have low cash flows in the startup phase, predominance of intangible assets, thus little collateral and high probability of default. Figure 9 showed that despite of SMEs constituting 90 % of total companies, they hold under 40% of total loans in 2013, supporting this view.

The main question of this thesis was "How will Basel III regulations affect SMEs and entrepreneurs' access to funding?" Although predicting the consequences of Basel III concerning SMEs and entrepreneurs' access to funding is hard to do at present time, the discussions in this paper have found some possible developments. The fact that not all countries are required to impose the Basel regulations on their financial and banking sector, as well as differences in current economic situation contributes to Basel III giving rise to divergence in the development of SME and entrepreneur lending geographically. Despite of this one would expect the implementation of Basel III to have a negative impact on SMEs and entrepreneurs' access to bank lending. On the other hand, the discussion suggest that the negative impact will not necessarily persist.

The analysis in section 6.2 found that the increase in required regulatory capital imposed by Basel III result in an increase in required capital for SME and entrepreneur loans. This implies an increased cost related to these loans relative to larger enterprise loans and the requirements under Basel II. Assuming there is a bank-lending channel the mechanisms of this cannel would result in a reduction in lending when the cost for the bank increases, suggesting a reduction in SME and entrepreneur loans relative to other loans. In addition, the cost of funding for SMEs and entrepreneurs will increase due to a raise in the credit risk premiums applied to these loans. Either directly related to the capital requirements and PD or indirectly through the liquidity- and leverage requirements.

The arguments related to the liquidity requirements does not directly imply that liquidity will result in a reduction in the supply of bank lending. However, reduction in revenues due to increased cost of funding and a shift towards lower yielding assets, suggests a dampening effect on the growth of Tier 1 capital. Taking into account the required regulatory capital coverage, the banks' ability to supply credit might be affected. The required regulatory capital for SME and entrepreneur loans increase under Basel III, implying that a curbing of Tier 1 capital growth may reduce SME and entrepreneur lending more than lending to larger enterprises.

In general, accessing funding is harder for innovative SMEs and entrepreneurs due to the uncertainty related to innovation and lack of tangible assets and early cash flow generation. However, analyzing the development of bank lending to SMEs and entrepreneurs in section 6.1, I would conclude that the deterioration in SME and entrepreneur lending is to some degree related to the recent financial crisis. This supports the view that SMEs and entrepreneurs' access to bank lending is highly dependent on the economic situation, even more than larger companies, because their access to funding, and probability of success or default, is more sensitive to economic fluctuations.

Stability in the economy reduces the probability of default, because it reduces the probability of a negative demand shock and lack of financing. Thus, stability reduce in required regulatory capital for SME and entrepreneur lending, and credit risk premiums added. In addition, a reduction in economic fluctuations reduces the procyclical behavior of both banks and Venture capitalists, which ensures a more stable access to funding for SMEs and entrepreneurs. Further, these arguments leads to the conclusion that, if Basel III provides a stable economy, the access to funding for SMEs and entrepreneurs will improve.

The secondary issue of this thesis was "How will these changes effect expected economic growth?" As studies and this thesis analysis suggests, the introduction of Basel III will cause a slowdown in economic growth. SMEs and entrepreneurs are, as emphasized, an essential contribution to growth. The potential of increasing value added to the economy exceeds that of mature enterprises. Thus, securing access to finance for SMEs and entrepreneurs is key to future growth. In a short-term perspective, Basel III will restrain access to funding for SMEs and entrepreneurs and hence put a dampening effect on economic growth. The long-term impact on economic growth is harder to determine. However, it is reasonable to conclude that if Basel III causes a more stable economic environment, consequently the regulation contributes to more continuous access to funding for SMEs and entrepreneurs. With more stable access to funding SMEs and entrepreneurs can contribute to economic growth to a larger scale than today. Therefore, it is reasonable to conclude that the long-term effects will be improvement of prospects for economic growth.

7.1 Perspectives

The implementation of Basel III will not be complete until 2019. Hence, conditions and surroundings will change until then. In addition, the framework is under continuous evaluation and opens for adjustments. Regardless, to secure a stable, robust economy without

compromising possibilities of innovation, regulatory authorities have to balance financial-stability and inclusion with comprehensive risk assessments against unexpected events.

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Appendix 1 – Basel I

Capital Definitions

Types of capital qualified to contribute to Tier 2 capital for the purpose of calculating capital coverage ratio under The Basel regulations. The same types of capital function as Tier 2 capital under Basel II and Basel III, but with some additional restrictions related to the use of Internal Ratings Based approaches.

Tier 2- Supplementary Capital

1. ***Undisclosed Reserves***

   Undisclosed reserves include reserves that have passed through the profit and loss account undisclosed, but accepted by the bank in question's supervisory authority. The reserves could be of the same inherent quality as the published retained earnings, but in an international setting, the absence of transparency and distinctive national regulations for these type of reserves, they are not included in Tier 1.

2. ***Revaluation Reserves***

   For some countries, their national regulations allow for valuing assets at their current value rather than historical cost. The revised reserves can be included in the capital base given that authorities find the assets to be reasonably valued, reflecting potential variation in price and possible forced sale. There is a condition of 55% discount of the difference between historic cost and market value.

3. ***General Provisions/General Loan Loss Reserves***

   Reserves held as a buffer to potential future losses can be included in tier 2, under the condition that they have not been assigned to specific assets or are created against identified losses and verifiable depreciation of assets value. Due to uncertainty about the value of balance-sheet assets and unidentified losses, an additional condition is put on this category of capital to be included in Tier 2. General provisions can not be more than 1.25% of risk-weighted assets.

4. ***Hybrid Debt Capital Instruments***

   Capital instruments with specific qualities of debt and equity. The specified characteristics affect its quality as capital; they have to be able to support potential losses without causing liquidation. On a country-to-country basis, conditions for these

instruments vary, but there is a set of requirements in order to be in line with the international regulations[52].

5. ***Subordinated Term Debt***

   Subordinated debt has a higher risk than other constituents of Tier 2 capital do. Hence, additional requirements are put on these instruments in order to make them qualified as capital. Instruments in this category must have an original fixed maturity of minimum five years, value up to 50 % of core capital and subject to satisfactory depreciation (write off) schemes[53] (Basel Committee on Banking Supervision, 1988, pp. 4-7, 18-20).

Risk Weights

In addition to the focus on credit risk, the Basel Committee recognized the problem with transferring of risk between countries. The committee decided upon a differentiation of countries sectioning countries into the OECD[54] and non- or outside the OECD countries. The OECD countries are considered to be of high credit standing and transactions with these countries attracted lower risk weights[55]. To preserve the international interbank market there are peculiar regulations for interbank claims.

Collateral reduces risk, but to what extent is hard to determine due to instability in value of assets used as collateral. As a result, the Basel Committee have no standard process of assigning risk weights to collateralized assets. The only standard regulation outlined in Basel I is for assets collateralized by cash or securities issued by OECD governments. These assets attract the same weight as the underlying collateral (zero or low weight). For assets with guarantees the same regulations apply. The risk weight assigned is equivalent with that attracted by the guarantor[56].

[52] Requirements include the instruments to be unsecured, subordinated and fully paid-up. They are not redeemable without supervisory authority's consent, they can be used to cover losses without forcing the bank to deviate from normal activities and even though interests on these instruments cannot be reduced or abandoned, they should allow for delay in payments of interests (Basel Committee on Banking Supervision, 1988, p. 19).

[53] A cumulative discount factor of 20% per year is be applied during the last five years to maturity. Due to the fact that these instruments can not be used to cover losses they are limited to 50% of tier 1.

[54] In context of Basel regulations, the OECD constitute countries that are full members of OECD or have concluded special lending arrangements with the IMF associated with the Fund's General Arrangements to borrowing.

[55] Claims on governments of the OECD countries attract risk weight of zero (low weight if interest risk is incorporated. Claims on governments outside the OECD can attract the same risk weight, given that claims are issued and funded in the national currency.

[56] For non-OECD incorporated banks and entities additional conditions apply.

For loans backed by residential property, that is rented or occupied by the debtor, a risk weight of 50% is applied (Basel Committee on Banking Supervision, 1988, pp. 8-14, 21-24).

On Balance Sheet Assets

Table 2- On Balance Sheet Assets

Risk-weight*	Assets
0%	- Cash including (at national preference) gold bars in own vaults or allocated, but backed by liabilities. - Claims on central governments and central banks issued and funded in national currency. - Other claims on OECD central governments and central banks. - Claims collateralized by cash of OECD central government securities or guaranteed by OECD central governments.
10%	
20%	- Claims on multilateral development banks[57] and claims guaranteed by or collateralized by securities issued by these banks. - Claims on banks incorporated in the OECD and loans guaranteed by OECD incorporated banks. - Claims on banks incorporated in countries outside the OECD with a residual maturity of up to one year and loans with a residual maturity of up to one year guaranteed by banks incorporated in countries outside the OECD. - Claims on non-domestic OECD public-sector entities, excluding central government, and loans guaranteed by such entities. - Cash items on process of collection.
50%	- Loans fully secured by mortgage on residential property that is or will be occupied by the borrower or that is rented.
100%	- Claims on private sector.

[57] IBRD, IADB, AsDB, AfDB EIB. Multilateral development banks in which G-10 countries are shareholding members may, at national discretion, also attract 20 % weight.

	- Claims on banks incorporated outside the OECD with a residual maturity of over one year. - Claims on central governments outside the OECD (unless denominated and funded in national currency. - Claims on commercial companies owned by the public sector. - Premises, plant, equipment, and other fixed assets. - Real estate and other investments (including non-consolidated investment participations in other companies). - Capital instruments issued by other banks (unless deducted form capital). - All other assets.

Source: (Basel Committee on Banking Supervision, 1988, pp. 21-22)

* 0, 10, 20, 50 % (at national preference): Claims on domestic public sector entities, excluding central government, and loans guaranteed by such entities.

Off Balance Sheet Items

The committee takes into account the risk of the off-balance sheet assets. The exposure to risk is determined by a "credit conversion factor" decided for particular instruments and transactions. The factors are derived from estimates of size, probability of credit exposures and a relative degree of credit risk[58]. In valuing the risk, the factors are multiplied by the risk weight relevant to the class of counterparty on-balance-sheet transaction.

Table 3- Off Balance Sheet Exposures

Credit Conversion Factors	**Instruments**
0%	- Commitments (e.g. formal standby facilities and credit lines) with an original maturity of up to one year, or which can be unconditionally cancelled at any time.
20%	- Short-term self-liquidating trade-related contingencies (such documentary credits collateralized by the underlying shipments).

[58] From the committee's 1986 paper "The management of banks' off-balance-sheet exposures: a supervisory perspective".

50%	- Certain transaction-related contingent items (e.g. performance bonds, bid bonds, warranties and standby letters of credit related to particular transactions). - Note issuance facilities and revolving underwriting facilities. - Other commitments (e.g. formal standby facilities and credit lines) with an original maturity of over one year.
100%	- Direct credit substitutes .e.g. general guarantees of indebtedness (including standby letters of credit serving as financial guarantees for loans and securities) and acceptances (including endorsement with the character of acceptance). - Sale and repurchase agreements and asset sales with recourse[59] where the credit risk remains with the bank. - Forward asset purchase, forward deposits and partly paid shares and securities[59], which present commitments with certain drawdown.

Source: (Basel Committee on Banking Supervision, 1988, pp. 23-34)

*For items related to interests and exchange rate (swaps, options, futures, etc.), there are two optional calculation methods for risk approved by the committee, current exposure method and original exposure method[60].

[59] These items will be weighted based on the type of assets not the type of counterparty the transaction has been made. Reverse repos will be treated as collateralized loans, with exposure to the counterparty as risk measurement. In cases of the asset being a security, which attracts advantageous risk weighting, the asset is perceived as collateral and the weight would be reduced correspondingly.

[60] Due to lack of relevance of these instruments for this particular paper, I will not go further in to the two calculation methods.

Appendix 2- Basel II

Additional Capital Restrictions

Investments by banks in commercial companies exceeding certain materiality levels[61] are to be deducted form capital with 50% from Tier 1 and 50 % from Tier 2. The limits for Tier 2 and Tier 3 capital in relation to Tier 1 is based on Tier 1 capital after deducting goodwill, but before deduction of investments.

For banks using the internal-ratings-based (IRB) approach, the option to use general provisions/general loss reserves as Tier 2 capital is removed. Banks using IRB methods for exposures to securitization or probability of default (PD)/ loss given default (LGD) for exposures to equity must first deduct expected losses (EL). If a bank uses the IRB approach for other assets have to compare total eligible provisions to total EL[62] calculated within the IRB method. If EL minus eligible provisions is negative, the difference must be deducted 50% form Tier 1 and 50% from Tier 2. If it is positive the difference qualify as Tier 2 capital up to 0.6% of risk-weighted assets (Basel Committee on Banking Supervision, 2006, pp. 9-12, 14-17).

Short-term Subordinated Debt Covering Market Risk – Tier 3

Basel II allow for national authorities to introduce a third tier of capital, Tier 3, for the sole purpose of meeting the capital requirements for market risks. Tier 3 capital must meet the definition of Tier 1 and Tier 2 capital and is limited to 250% of Tier 1 capital required to support market risk (Basel Committee on Banking Supervision, 2006, p. 17).

[61] National accounting and regulatory authorities will determine these levels.
[62] Sum of expected losses associated with the representative exposures and multiply with exposure at default (EAD).

Appendix 3- Basel III

Specific criteria for the tiers of capital under Basel III. To qualify as capital for the purpose of keeping adequate capital in line with the Basel III minimum standards. The criteria presented is a supplement to the description of the tiers in subsection 3.3.1.

Table 4- Criteria for Common Share Tier 1 Capital

Criteria for Classification as Common Shares for Regulatory Capital Purposes
1. Represents the most subordinated claim in liquidation of the bank.
2. Entitled to a claim on the residual assets that is proportional with its share of issued capital, after all senior claims have been repaid in liquidation (i.e. has an unlimited and variable claim, not a fixed or capped claim).
3. Principal is perpetual and never repaid outside of liquidation (setting aside discretionary repurchases or other means of effectively reducing capital in a discretionary manner that is allowable under relevant law).
4. The bank does nothing to create an expectation at issuance that the instrument will be bought back, redeemed or cancelled nor do the statutory or contractual terms provide any feature which might give rise to such an expectation.
5. Distributions are paid out of distributable items (retained earnings included). The level of distributions is not in any way tied or linked to the amount paid in at issuance and is not subject to a contractual cap (except to the extent that a bank is unable to pay distributions that exceed the level of distributable items).
6. There are no circumstances under which the distributions are obligatory. Non payment is therefore not an event of default.
7. Distributions are paid only after all legal and contractual obligations have been met and payments on more senior capital instruments have been made. This means that there are no preferential distributions, including in respect of other elements classified as the highest quality issued capital.
8. It is the issued capital that takes the first and proportionately greatest share of any losses as they occur. Within the highest quality capital, each instrument absorbs losses on a going concern basis proportionately and pari passu with all the others.
9. The paid in amount is recognized as equity capital (i.e. not recognized as a liability) for determining balance sheet insolvency.
10. The paid in amount is classified as equity under the relevant accounting standards.

11. It is directly issued and paid-in and the bank can not directly or indirectly have funded the purchase of the instrument.
12. The paid in amount is neither secured nor covered by a guarantee of the issuer or related entity or subject to any other arrangement that legally or economically enhances the seniority of the claim.
13. It is only issued with the approval of the owners of the issuing bank, either given directly by the owners or, if permitted by applicable law, given by the Board of Directors or by other persons duly authorized by the owners.
14. It is clearly and separately disclosed on the bank's balance sheet.

Source: (Basel Committe on banking supervision, 2011, pp. 14-15)

Table 5- Criteria for Additional Tier 1 Capital

Criteria for Inclusion in Additional Tier 1 Capital
1. Issued and paid-in
2. Subordinated to depositors, general creditors and subordinated debt of the bank
3. s neither secured nor covered by a guarantee of the issuer or related entity or other arrangement that legally or economically enhances the seniority of the claim vis-à-vis bank creditors
4. Is perpetual, i.e. there is no maturity date and there are no step-ups or other incentives to redeem
5. May be callable at the initiative of the issuer only after a minimum of five years: a. To exercise a call option a bank must receive prior supervisory approval; and b. A bank must not do anything which creates an expectation that the call will be exercised; and c. Banks must not exercise a call unless: i. They replace the called instrument with capital of the same or better quality and the replacement of this capital is done at conditions which are sustainable for the income capacity of the bank; or ii. The bank demonstrates that its capital position is well above the minimum capital requirements after the call option is exercised.
6. Any repayment of principal (e.g. through repurchase or redemption) must be with prior supervisory approval and banks should not assume or create market expectations that supervisory approval will be given
7. Dividend/coupon discretion:

a. the bank must have full discretion at all times to cancel distributions/payments b. cancellation of discretionary payments must not be an event of default c. banks must have full access to cancelled payments to meet obligations as they fall due d. cancellation of distributions/payments must not impose restrictions on the bank except in relation to distributions to common stockholders.
8. Dividends/coupons must be paid out of distributable items
9. The instrument cannot have a credit sensitive dividend feature, that is a dividend/coupon that is reset periodically based in whole or in part on the banking organization's credit standing.
10. The instrument cannot contribute to liabilities exceeding assets if such a balance sheet test forms part of national insolvency law.
11. Instruments classified as liabilities for accounting purposes must have principal loss absorption through either (i) conversion to common shares at an objective pre-specified trigger point or (ii) a write-down mechanism which allocates losses to the instrument at a pre-specified trigger point. The write-down will have the following effects: a. Reduce the claim of the instrument in liquidation; b. Reduce the amount re-paid when a call is exercised; and c. Partially or fully reduce coupon/dividend payments on the instrument.
12. Neither the bank nor a related party over which the bank exercises control or significant influence can have purchased the instrument, nor can the bank directly or indirectly have funded the purchase of the instrument
13. The instrument cannot have any features that hinder recapitalization, such as provisions that require the issuer to compensate investors if a new instrument is issued at a lower price during a specified time frame
14. If the instrument is not issued out of an operating entity or the holding company in the consolidated group (e.g. a special purpose vehicle – "SPV"), proceeds must be immediately available without limitation to an operating entity18 or the holding company in the consolidated group in a form which meets or exceeds all of the other criteria for inclusion in Additional Tier 1 capital

Source: (Basel Committe on banking supervision, 2011, pp. 15-17)

Table 6- Criteria for Tier 2 Capital

Criteria for Inclusion in Tier 2 Capital
1. Issued and paid-in
2. Subordinated to depositors and general creditors of the bank
3. Is neither secured nor covered by a guarantee of the issuer or related entity or other arrangement that legally or economically enhances the seniority of the claim vis-à-vis depositors and general bank creditors
4. Maturity: a. minimum original maturity of at least five years b. recognition in regulatory capital in the remaining five years before maturity will be amortized on a straight line basis c. there are no step-ups or other incentives to redeem
5. May be callable at the initiative of the issuer only after a minimum of five years: a. To exercise a call option a bank must receive prior supervisory approval; b. A bank must not do anything that creates an expectation that the call will be exercised; and c. Banks must not exercise a call unless: i. They replace the called instrument with capital of the same or better quality and the replacement of this capital is done at conditions which are sustainable for the income capacity of the bank20; or ii. The bank demonstrates that its capital position is well above the minimum capital requirements after the call option is exercised.
6. The investor must have no rights to accelerate the repayment of future scheduled payments (coupon or principal), except in bankruptcy and liquidation.
7. The instrument cannot have a credit sensitive dividend feature, that is a dividend/coupon that is reset periodically based in whole or in part on the banking organization's credit standing.
8. Neither the bank nor a related party over which the bank exercises control or significant influence can have purchased the instrument, nor can the bank directly or indirectly have funded the purchase of the instrument
9. If the instrument is not issued out of an operating entity or the holding company in the consolidated group (e.g. a special purpose vehicle – "SPV"), proceeds must be immediately available without limitation to an operating entity or the holding

company in the consolidated group in a form which meets or exceeds all of the other criteria for inclusion in Tier 2 Capital

Source: (Basel Committe on banking supervision, 2011, pp. 18-19)

Global Liquidity Standard

Table 7- Assets

Factors are to be multiplied with the total amount of each item (applies to table 7-9)

Item	**Factor**
Level 1 assets:	
- Coins and bank notes - Qualifying marketable securities from sovereigns, central banks, PSEs, and multilateral development banks - Qualifying central bank reserves - Domestic sovereign or central bank debt for non-0% risk-weighted Sovereigns	100%
Level 2A assets (maximum of 40% of HQLA)	
- Sovereign, central bank, multilateral development banks, and PSE assets qualifying for 20% risk weighting - Qualifying corporate debt securities rated AA- or higher - Qualifying covered bonds rated AA- or higher	85%
Level 2B assets (maximum of 15% of HQLA)	
- Qualifying RMBS - Qualifying corporate debt securities rated between A+ and BBB- - Qualifying common equity shares	75% 50% 50%
Total value of HQLA	

Source: (Basel committe on banking supervision, 2013, p. 66)

Table 8- Cash Outflows

Retail deposits	
Demand deposits and term deposits (less than 30 days maturity) - Stable deposits (deposit insurance scheme meets additional criteria) - Stable deposits - Less stable retail deposits	 3% 5% 10%

Term deposits with residual maturity greater than 30 days	0%
Unsecured wholesale funding	
Demand and term deposits (less than 30 days maturity) provided by small business customers: - Stable deposits - Less stable deposits	 5% 10%
Operational deposits generated by clearing, custody and cash management activities - Portion covered by deposit insurance	25% 5%
Cooperative banks in an institutional network (qualifying deposits with the centralized institution)	25%
Non-financial corporates, sovereigns, central banks, multilateral development banks, and PSEs - If the entire amount fully covered by deposit insurance scheme	40% 20%
Other legal entity customers	100%
Secured funding	
- Secured funding transactions with a central bank counterparty or backed by Level 1 assets with any counterparty. - Secured funding transactions backed by Level 2A assets, with any counterparty - Secured funding transactions backed by non-Level 1 or non-Level 2A assets, with domestic sovereigns, multilateral development banks, or domestic PSEs as a counterparty - Backed by RMBS eligible for inclusion in Level 2B - Backed by other Level 2B assets - All other secured funding transactions	0% 15% 25% 25% 50% 100%
Additional requirements	
Liquidity needs (e.g. collateral calls) related to financing transactions, derivatives and other contracts	3 notch downgrade
Market valuation changes on derivatives transactions (largest absolute net 30-day collateral flows realized during the preceding 24 months)	Look back approach
Valuation changes on non-Level 1 posted collateral securing derivatives	20%
Excess collateral held by a bank related to derivative transactions that	100%

could contractually be called at any time by its counterparty	
Liquidity needs related to collateral contractually due from the reporting bank on derivatives transactions	100%
Increased liquidity needs related to derivative transactions that allow collateral substitution to non-HQLA assets	100%
ABCP, SIVs, conduits, SPVs, etc.:	
Liabilities from maturing ABCP, SIVs, SPVs, etc. (applied to maturing amounts and returnable assets)	100%
Asset Backed Securities (including covered bonds) applied to maturing amounts.	100%
Currently undrawn committed credit and liquidity facilities provided to:	
Retail and small business clients	5%
non-financial corporates, sovereigns and central banks, multilateral development banks, and PSEs	10% for credit 30% for liquidity
Banks subject to prudential supervision	40%
Other financial institutions (include securities firms, insurance companies)	40% for credit 100% for liquidity
Other legal entity customers, credit and liquidity facilities	100%
Other contingent funding liabilities (such as guarantees, letters of credit, revocable credit and liquidity facilities, etc.) - Trade finance - Customer short positions covered by other customers' collateral	National discretion 0-5% 50%
Any additional contractual outflows	100%
Net derivative cash outflows	100%
Any other contractual cash outflows	100%
Total cash outflows	

Source: (Basel committe on banking supervision, 2013, pp. 67-68)

Table 9-Cash Inflows

Maturing secured lending transactions backed by the following collateral:	
Level 1 assets	0%

Level 2 assets	15%
Level 2B assets - Eligible RMBS - Other assets	 25% 50%
Margin lending backed by all other collateral	50%
All other assets	100%
Credit or liquidity facilities provided to the reporting bank	0%
Operational deposits held at other financial institutions (include deposits held at centralized institution of network of co-operative banks)	0%
Other inflows by counterparty: - Amounts to be received from retail counterparties - Amounts to be received from non-financial wholesale counterparties, from transactions other than those listed in above inflow categories - Amounts to be received from financial institutions and central banks, from transactions other than those listed in above inflow categories	 50% 50% 100%
Net derivative cash inflows	100%
Other contractual cash inflows	National discretion
Total cash inflows	
Total net cash outflows = Total cash outflows minus min [total cash inflows, 75% of gross outflows]	
LCR = Stock of HQLA / Total net cash outflows	

Source: (Basel committe on banking supervision, 2013, p. 69)

Appendix 4- Modigliani and Miller (1958)

First Modigliani and Miller (MM) assumed neutral taxes, no asymmetric information, no bankruptcy costs and no transaction costs. Second, they defined firms in classes based on equivalent returns on shares. Firms in each class were thereby homogeneous. Second, they used Marshallian price theory with perfect markets and perfect competition. Under the Marshallian theory, price per dollars' worth of expected return is equal for all shares in one firm class. The price is proportional with the expected return in a rate $\frac{1}{p_k}$ with a price P_j and expected return $\tilde{x}_j$ the price would be:

$P_j = \frac{1}{p_k} * \tilde{x}_j \rightarrow p_k = \frac{\tilde{x}_j}{P_j}$, where p_k [63] is a constant for all firms j in class k.

In the article (MM) considered a random company j with the expected return on company assets, $\overline{X_j}$ (before deduction of interests). Defining D_j as the market value of the debt and S_j as the market value of common stocks, the market value of all securities (company value) can be written as: $V_j = (S_j + D_j)$. Which implies, in equilibrium, that:

(1) $V_j = (S_j + D_j) = \frac{\overline{X_j}}{p_k}$, for any firm j in class k.

Equation (1) shows that the market value of a company is independent of capital structure and is determined by capitalizing its expected return at the rate p_k suitable to its class.

By defining average cost of capital as the expected return to company value: $\frac{\overline{X_j}}{V_j}$. We can write:

(2) $p_k = \frac{\overline{X_j}}{(S_j + D_j)}$, for any firm j, in class k.

[63] P_k have several economic interpretations

- Expected return
- $\frac{1}{p_k}$ is the price which the investor have to pay for a dollar's worth of expected return
- I compliance with theory on bonds with no maturity p_k can be interpreted as the market rate of capitalization for the expected value of uncertain steams of the type created by the k^{th} class of firms.

Equation (2) implies that the average cost of capital for any firm is independent of capital structure and is and is equal to the capitalization rate of pure equity stream of its class (Modigliani & Miller, 1958, pp. 266-269).

If equation 1 and 2 do not hold, there is possibilities for arbitrage, but as investors utilize the arbitrage opportunities, the value of overpriced shares will fall and that of underpriced shares will rise, thereby remove divergence between market values of the firms. (Modigliani & Miller, 1958, p. 269)

Appendix 5- Impact of Liquidity Requirements on Lending Spreads

Calculations based on the Basel Committee "An assessment of the long-term economic impact of stronger capital and liquidity requirements". The paper research costs of meeting the requirements without reducing profitability (ROE).

Table 10-Impact of Increases in Capital and Liquidity Requirements in Lending Spreads (in basis points)

Increase in capital ratio (percentage points)	**Cost to meet capital (A)**	**Cost to meet NSFR (B)**	**Total (A+B)**	**Cost to meet NSFR (C)**	**Total (A+C)**
		Assuming RWA unchanged		Accounting for decline in RWA	
0	0	25	25	14	14
+1	13	25	38	13	26
+2	26	25	51	13	39
+3	39	24	63	11	50
+4	52	24	76	8	60
+5	65	24	89	6	71
+6	78	23	101	5	83
Inter-quartile range (25th to 75th percentile for 1 percentage point change in capital	9 to 19	16 to 46		11 to 25	

Source: (Basel committe on Banking Supervision, 2010, p. 23)

Appendix 6- Capital Requirements and Credit Risk Premiums

It should be noted that these calculations apply to Spain. Due to the fact that Spain is one of the countries with severe sovereign debt problems causing problem for the real economy and economic growth the numbers are expected to be higher than for countries that are closer to a "normal" real economy situation. However, the calculations are based on the requirements of the Basel regulations; hence, it is reasonable to argue that the observed trend (overall picture) applies to other countries, albeit at a different scope. These calculations take into account capital requirements, liquidity requirements and leverage ratio (all new regulations of the Basel II and Basel III provisions).

Table 11 shows the capital requirements in percentage, for loans to SMEs viewing SMEs as part of a retail portfolio.

Table 11- Capital Requirements for SMEs Considered as Retail

			Basel II		Basel III			
Rating	**PD**	**Weight**	**CR**	**Cum. weight**	**CR**	**Cum. weight**	**Cases**	**Default**
A	0.107%	0.0984	0.0100	0.098%	0.0131	0.129%	933	1
BBB+	0.174%	0.1823	0.0140	0.354%	0.0184	0.464%	1,729	3
BBB	0.244%	0.1726	0.0177	0.659%	0.0232	0.865%	1,637	4
BB	0.823%	0.1409	0.0356	1.160%	0.0467	1.522%	1,336	11
B+	2.436%	0.1818	0.0514	2.094%	0.0674	2.748%	1,724	42
B	5.927%	0.0836	0.0573	2.573%	0.0753	3.378%	793	47
CCC	28.625%	0.1404	0.0963	**3.926%**	0.1264	**5.152%**	1,331	381
Average	5.157%					Total	9,483	489

Source: (Cardone-Riportella, et al., 2011, p. 32)

*PD is probability of default, LGD is loss given default (assumed 45%), CR is the capital requirement (regulatory capital), as a percentage of the exposure at default (EAD) calculated by using equation (5) in Table 14 for Basel II and equation (6) for Basel III. Weight is calculated using the percent of firms in each rating class. Cum weight is the product of (CR) and the weights cumulated to obtain the total requirement. Cases is the distribution of total firms and Default is the number of default firms for each class.

Table 12 shows the capital requirements, in percentage, for a loan to an SME in the corporate category, with average annual sales of €12.1 million.

Table 12- Capital Requirements for SMEs Considered as Corporate (sales below €25 millions)

			Basel II		Basel III			
Rating	**PD**	**Weight**	**CR**	**Cum. weight**	**CR**	**Cum. weight**	**Cases**	**Default**
A	0.126%	0.0986	0.02477	0.244%	0.0325	0.320%	793	1
BBB+	0.180%	0.1382	0.03003	0.659%	0.0394	0.865%	1,112	2
BBB	0.256%	0.2910	0.03613	1.710%	0.0474	2.245%	2,341	6
BB+	1.113%	0.0782	0.06734	2.237%	0.0884	2.936%	629	7
BB	1.820%	0.1298	0.07749	3.242%	0.1017	4.256%	1,044	19
BB-	4.705%	0.1136	0.09890	4.366%	0.1298	5.730%	914	43
CCC	28.442%	0.1508	0.17832	**7.054%**	0.2340	**9.259%**	1,213	345
Average	5.257%					Total	8,046	423

Source: (Cardone-Riportella, et al., 2011, p. 33)

* Assumed maturity of the operation is 3 years. CR is calculated using equation (8) for Basel II and equation (9) for Basel III in Table 14. Other variables have the same indications as for Table 11.

Table 13 shows the capital requirements, in percentage, for a loan to an SME in the corporate category, with average annual sales of €33.4 million.

Table 13- Capital Requirements for SMEs Considered as Corporate (sales between €25millions and €50 millions)

			Basel II		Basel III			
Rating	**PD**	**Weight**	**CR**	**Cum weight**	**CR**	**Cum weight**	**Cases**	**Default**
BBB+	0.183%	0.3800	0.04021	1.528%	0.0528	2.005%	546	1
BB	1.042%	0.0668	0.07885	2.055%	0.1035	2.697%	96	1
BB-	1.852%	0.0752	0.09198	2.746%	0.1207	3.604%	108	2
B+	2.335%	0.1788	0.09715	4.483%	0.1275	5.884%	257	6
B	7.071%	0.2067	0.13327	7.238%	0.1749	9.500%	297	21
CCC	26.316%	0.0926	0.19717	**9.063%**	0.2588	**11.895%**	133	35
Average	4.593%					Total	1,437	66

Source: (Cardone-Riportella, et al., 2011, p. 33)

* Assumed maturity of the operation is 5 years. The other indicators indicate the same as Table 12.

Table 14- Equations for Calculating Capital Requirements (CR)

SMEs as retail	
Capital requirement CR	$CR(BII) = \left\langle LGD \times N\left[\frac{G(PD)+\sqrt{R}\times G(0.999)}{\sqrt{1-R}}\right] - PD \times LGD \right\rangle \times 1.06$ (5) $CR(BIII) = CR(BII) \times 0.105/0.08$ (6)
Correlation R	$R = 0,03 \cdot \left(\frac{1-e^{-35 \cdot PD}}{1-e^{-35}}\right) + 0,16 \cdot \left[1-\left(\frac{1-e^{-35 \cdot PD}}{1-e^{-35}}\right)\right]$ (7)
SMEs as corporate	
Capital requirement CR	$CR(BII) = \left\langle LGD \times N\left[\frac{G(PD)+\sqrt{R}\times G(0.999)}{\sqrt{1-R}}\right] - PD \times LGD \right\rangle \left\langle \frac{1+(M-2.5)\times b}{1-1.5\times b} \right\rangle \times 1.06$ (8) $CR(BIII) = CR(BII) \times 0.105/0.08$ (9)
Correlation R	$R = 0,12 \cdot \left(\frac{1-e^{-50 \cdot PD}}{1-e^{-50}}\right) + 0,24 \cdot \left[1-\left(\frac{1-e^{-50 \cdot PD}}{1-e^{-50}}\right)\right] - 0,04 \cdot \left(\frac{1-(S-5)}{45}\right)$ (10)
Maturity adjustment	$b = [0,11852 - 0,05478 \cdot \ln(PD)]^2$
Where: CR: Capital requirement. LGD: Loss given default. N (x): Standard normal cumulative distribution. R: Correlation. G (z): Inverse standard normal cumulative distribution. PD: Probability of default. M: Maturity of the operation. *b:* Maturity adjustment.	

*According to the Basel II and Basel III accord.

Source: (Cardone-Riportella, et al., 2011, p. 25)

Table 15 shows the credit risk premiums for SMEs for the internal ratings based approach.

Table 15- Credit Risk Premiums for SMEs, as a Percentage of the EAD

SME treated as Corporate								
a) Firms with average sales of € 12.1 m. (small firms)								
				Basel II			**Basel III**	
Rating	**PD**	**EL**	**CR**	**ROE x CR**	**CRP**	**CR**	**ROE x CR**	**CRP**
A	0.126%	0.057%	2.477%	0.362%	0.418%	3.251%	0.475%	0.531%
BBB+	0.180%	0.081%	3.003%	0.439%	0.519%	3.942%	0.576%	0.656%
BBB	0.256%	0.115%	3.613%	0.527%	0.643%	4.742%	0.692%	0.808%
BB+	1.113%	0.501%	6.734%	0.983%	1.484%	8.838%	1.290%	1.791%
BB	1.820%	0.819%	7.749%	1.131%	1.950%	10.171%	1.485%	2.304%
BB-	4.705%	2.117%	9.890%	1.444%	3.561%	12.981%	1.895%	4.012%
CCC	28.442%	12.799%	17.832%	2.603%	15.402%	23.404%	3.417%	16.216%
b) Firms with average sales of € 33.4 m. (medium firms)								
				Basel II			**Basel III**	
Rating	**PD**	**EL**	**CR**	**ROE x CR**	**CRP**	**CR**	**ROE x CR**	**CRP**
BBB+	0.183%	0.082%	4.021%	0.587%	0.670%	5.278%	0.771%	0.853%
BB	1.042%	0.469%	7.885%	1.151%	1.620%	10.348%	1.511%	1.980%
BB-	1.852%	0.833%	9.198%	1.343%	2.176%	12.072%	1.762%	2.596%
B+	2.335%	1.051%	9.715%	1.418%	2.469%	12.750%	1.862%	2.912%
B	7.071%	3.182%	13.327%	1.946%	5.128%	17.492%	2.554%	5.736%
CCC	26.316%	11.842%	19.717%	2.879%	14.721%	25.879%	3.778%	15.620%
SME treated as Retail								
				Basel II			**Basel III**	
Rating	**PD**	**EL**	**CR**	**ROE x CR**	**CRP**	**CR**	**ROE x CR**	**CRP**
A	0.107%	0.048%	0.996%	0.145%	0.194%	1.307%	0.191%	0.239%
BBB+	0.174%	0.078%	1.402%	0.205%	0.283%	1.840%	0.269%	0.347%
BBB	0.244%	0.110%	1.767%	0.258%	0.368%	2.319%	0.339%	0.449%
BB	0.823%	0.371%	3.556%	0.519%	0.890%	4.668%	0.681%	1.052%
B+	2.436%	1.096%	5.138%	0.750%	1.846%	6.744%	0.985%	2.081%
B	5.927%	2.667%	5.735%	0.837%	3.504%	7.527%	1.099%	3.766%
CCC	28.625%	12.881%	9.634%	1.407%	14.288%	12.645%	1.846%	14.727%

Source: (Cardone-Riportella, et al., 2011, p. 34)

* PD is from Tables 11-13, LGD is assumed 45%, EL is the expected loss as percent of exposure to risk (estimated as the product of both PD and LGD), ROE is the average return on equity (2000-2009), and CR is from Tables 11-13. ROE*CR is the opportunity cost of regulatory capital and CRP is the Credit Risk Premium (sum of expected loss (EL) and the opportunity cost of the regulatory capital (ROE x CR)).