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Do Increased Capital Requirements Lead to Higher Interest Margins?

-A Study in the Swedish Banking Sector

Bachelor thesis in Financial Economics (15 credits)

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Abstract

This paper examines the impacts of the capital ratios stipulated in Basel III on banks' interest margins. The Basel III rules were established as a response to the financial crisis in 2007-2009 when it became obvious that the previously existing rules were unable to cope with the growing complexity of the financial markets. The four largest banks in Sweden are analyzed: Nordea, Svenska Handelsbanken, SEB and Swedbank. The central theoretical backbone is the Modigliani Miller theorem with the presence of corporate taxes, which states that when a firm's equity to total assets increases, the results are higher funding costs. The results of the quantitative study show that capital ratios calculated using risk-weights do not seem to have a significant effect on interest margins for the four largest banks in Sweden. However, the Equity Ratio calculated on total assets, using no risk-weights, has a positive effect on interest margins in the Swedish banking market. This empirically provides support for the specialized Modigliani Miller theorem with corporate taxes.

Key Words: Banking, Basel III, Modigliani Miller, Capital Ratio, Capital Requirements, Interest Margins, Sweden

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Introduction

The financial crisis that started in the US in 2007-2008 has since then had a massive effect on the world economy. What led to the crisis was that banks were too fragile partly due to a strong interconnectedness between the banks while lacking sufficient capital to absorb the losses. The interconnectedness created a type of domino effect where one bank's fall affected several other banks. As a result, a number of banks became insolvent and the consequences further spread across the banking system (Acharya et al. 2011). Many banks had been taking excessive risks in different types of mortgage-backed securities. These were placed in off-balance sheet instruments, which paved the way for higher leverage and as a consequence, higher risk. When house prices started to decline and the market lost confidence in these securities, it led to a breakdown in the financial sector. This spread and affected large parts of the economy and ultimately state bailouts and guarantees were needed to prevent the financial sector from collapsing (BIS 2010).

The financial system is still highly interconnected. The interconnectedness causes systemic risk, which means that there is a risk for the entire banking system. If a bank is considered systemically important, chances are higher that the bank will be bailed out in case of liquidity shortage or insolvency. This creates an incentive for banks to become bigger and gain status as systemically important, thereby making them too big to fail and removing the threat of bankruptcy. Furthermore, when there is no risk for bankruptcy, the banks have an incentive to increase their level of risk to become more profitable through leverage. In times of economic expansion, banks can increase their profitability through borrowing rather than using its equity (capital). However, in times of economic contraction, capital is important in order to prevent bankruptcy. If the bank does not have enough capital in bad times and they experience losses, the risk is larger that the bank becomes insolvent. The alternatives then are either bankruptcy or hoping to be bailed out by the government, using taxpayers' money, thereby causing a massive cost to society (Admati & Hellwig 2013).

The Basel rules aim to make the banking system more stable and reduce the risks, making the banks have higher capital ratios, adjusting the rules for what is allowed to be included in the capital of a bank and sharpening the rules for how to calculate risk-weighted assets (RWA) (Riksbank 2011). The previous Basel-frameworks have obviously not been sufficient in their role to stabilize the financial markets and as a response to the financial crisis; the new Basel III rules were implemented starting in November 2010 and are expected to be fully implemented 2019 (Acharya et al. 2011).

The specialized Modigliani Miller theorem with corporate taxes suggests that the funding costs decrease for a firm with a higher composition of debt in contrast to equity (Modigliani & Miller 1958). This implies that higher capital requirements would lead to higher funding costs. There are several studies suggesting that the higher funding costs resulting from increased capital ratios, in turn will increase interest margins (Angbazo 1997) and/or interest rate spreads (Slovik & Cournède 2011). Interest margins are the difference between the banks' interest income and interest costs. Interest rate spreads are the difference in lending and borrowing rates. As a result of Basel III, do increased funding costs for large complex financial institutions cause the banks to increase their interest margins in order to maintain their profits?

Purpose

The aim of this paper is to empirically test if the capital ratios defined in the Basel III rules affect a bank's Net Interest Margins through an increase in funding costs, focusing on the four main Swedish large complex financial institutions (LCFI).

Limitations of the Study

The study will be made in the Swedish banking industry. The four major LCFIs in Sweden are included in the study over a five-year period reaching from 2009 to the first quarter of 2014. Only Swedish banks are included in the study, as the ambition is to be able to generalize the results in the Swedish banking sector. Three different types of capital ratios will be examined in order to establish if there are differences between the ratios in the effects on interest margins.

Disposition

The paper starts with an introduction of the fundamental role of capital in a bank, after which a brief history of the development of the Basel Committee of Banking Supervision follows. This leads to the necessity of further development of the rules after the shortcomings of the previous framework is made clear when investigating the effects of the financial crisis of 2007-2009. As a result of the crisis, Basel III was developed. These accords are explained in the following section. The theory concerns what factors determine a firm's funding costs and which role the composition of capital and debt plays in deciding these costs. The methodology presents the statistical model developed in order to test the theory and in the results and analysis, the findings are presented. The final part consists of the conclusions and proposals for further study of the subject.

Background

Bank Assets and Funding

In order to fully comprehend the Basel III regulations and its impacts, it is first beneficial to clarify how banks' balance sheets i.e. their assets and liabilities (funding) are constructed and what risks banks are exposed to, potentially causing a bank to fail. Figure I illustrates a simplified overview of a bank's assets and funding. The funding consists partly of shareholders' equity, which in banking is the primary component of the bank's capital, and debt. The debt is divided into deposits, short-term and long-term debt. The short-term debt is usually the primary debt borrowed in the money market, which typically implies borrowing from other financial institutions. In other words, the banking system is closely interlinked. The asset side of the balance sheet comprises short-term loans, long-term loans, reserves and other investments.

Assets	Liabilities
Short-term loans Long-term loans Reserves Other investments	Deposits Short-term debt Long-term debt
	Shareholder equity (Capital)

Figure I - A simplified balance sheet of a bank.

Banking Capital

What constitutes banking capital is complex. In addition to common stock, other categories can also be counted as capital e.g. preferred stock and to a limited extent some types of debt such as subordinated debt with a perpetual or very long-term maturity (Elliot 2010a). One definition is that capital is the portion of the bank's funding which is not legally bounded to be repaid to anyone. Capital is the equity of a bank's capital structure and should not be confounded with reserves. An argument often made by banks is that the costs will increase as the banks are forced to "hold" more capital in the same way they are forced to hold reserves. This is not a valid argument since capital and reserves are two different things. The reserve level limits how much banks can lend by stating a minimum percentage of the aggregate lending the bank must keep in reserves. If the reserve ratio for example is 5 % this means that if the bank lends 100 USD to a customer, the bank must keep 5 USD in reserves. In contrast, capital requirements only states what fraction of the total assets that must consist of non-borrowed funds instead of debt, which means banks do not need to hold capital in the same way they need to hold reserves (Admati & Hellwig 2013).

Advantages and Disadvantages with Capital in Comparison to Debt

According to the *basic* Modigliani Miller theorem (MM) (assuming no taxes, no bankruptcy costs etc.), the value and funding costs of a firm are the same for an unlevered and a levered firm (Modigliani and Miller 1958). Therefore, leverage cannot increase the value of the firm. It can however increase its return on equity (ROE) i.e. the firm's profitability on the owners' share of the firm. Imagine buying a house at a price of 1,000,000 SEK. If you purchase the house using your own capital, if the house price appreciates 10% and you sell it after one year, you will make 10% on your down payment. Instead imagine that you are borrowing 850,000 SEK at a 5% interest rate in order to purchase the same house i.e. you pay 42,500 SEK interest per year. Your down payment is now 150,000 SEK, thus borrowing 85% of the house purchase price. The listing below illustrates the return on equity when prices rise or fall using both leverage (paying 5% interest) and only your own capital to purchase the house. ROE (given no installment) is defined as the earnings of the price-increase minus the interest payment divided by the down payment.

1. Price rises 10%, no leverage: $\frac{\text{Earnings:100,000}}{\text{DownPayment:1,000,000}} = 10\%$

2. Price rises 10%, 85% borrowed: $\frac{\text{Earnings:100,000} - \text{Interest:42,500}}{\text{DownPayment:150,000}} = 38,3\%$

3. Price declines by 10%, no leverage: $\frac{\text{Losses:} - 100,000}{\text{DownPayment:1,000,000}} = -10\%$

4. Price declines by 10%, 85% borrowed: $\frac{\text{Losses:} - 100,000 - \text{Interest:42,500}}{\text{DownPayment:150,000}} = -95\%$

These equations illustrate the increased sensitivity when a firm is using leverage rather than capital. Also, the potential losses on total capital are greater than the potential earnings when exploiting the same level of leverage. In times of economic expansion, the leverage increases the return on equity but in times of economic contraction, a larger leverage ratio will increase the losses in relation to equity, which is made clear in the fourth equation where almost all of the down payment is lost when the price declines. Please note that this is an example buying a house. Banks often use higher leverage ratios, thus increasing the sensitivity.

Also note that even if your profitability increases with leverage, the value of the house is the same in both situations in accordance with MM.

Capital is of great importance when a financial firm falls into distress. The distress situation can be described as a downward liquidity spiral: When a financial firm with insufficient capital suffers asset losses, the firm's funding decreases, forcing the firm to sell its assets, leading to further funding problems (Brunnermeier & Pedersen 2009). If however, the financial firm would have had a greater level of capital, the negative spiral could be decelerated. The solvency risk is reduced and the liquidity risk through risk for runs is also indirectly reduced because depositors and other creditors tend to be less anxious about their money (Admati & Hellwig 2013). Hence, illiquidity and insolvency are closely interlinked.

Solvency and Liquidity

A financial firm is exposed to mainly two types of risk: Solvency (capital risk) and liquidity risk. Solvency risk is the risk that the market value of a bank's assets falls below its obligations. Liquidity risk, on the other hand, implies that the bank cannot convert its illiquid assets into cash in order to pay off its obligations (Acharya et al. 2011). Banks and other financial institutions are particularly susceptible to liquidity risk because of its tendency to hold assets with long-term duration or low liquidity when, at the same time, their liabilities are highly short-term in nature (Acharya et al. 2011). This is a prerequisite for bank runs i.e. many depositors demand their deposits back at the same time, while the bank is unable to convert the long-term assets into cash. One should note that the two types of risk are interlinked in the sense that most bank runs are triggered by indication of a bank's insolvency (Admati & Hellwig 2013).

Because of the banking system's close interconnectedness, when one financial firm defaults, the losses spread throughout the system leading to aggregate shortfall of capital. This is partly due to the interconnectedness e.g. that banks borrow from each other, but also because of herd-behavior i.e. banks tend to hold similar assets (Acharya et al. 2011). In a broader perspective, this so-called systemic risk may be viewed as the most important risk since it does not only affect specific banks but larger parts of the economy. Systemic risk is increased by the phenomenon commonly known as financial firms being "too big to fail". This suggests that when a financial firm becomes sufficiently large and interconnected with other firms, the economy as a whole could face severe consequences if the firm defaults. As an intervention for mitigating the risks of the banks being "too big to fail", governments institute guarantees protecting financial firms from bankruptcy. These guarantees can serve as incentives for banks becoming "too big to fail", meaning that banks strive to become large in order to receive the guarantees. However, government guarantees can cause problems in the sense that they create a moral hazard. The guaranteed banks are aware of their protected financial situation, which can lead to further risk taking even in financial distress (Turner 2010).

Basel Accords

When the fairly small German bank Herstatt failed in 1973, the central bank governors of the G-10 countries observed a need for a new universal banking supervisory body and established the Basel Committee on Banking Supervision (BCBS) the following year. Its accords are implemented by the member states (BIS 2010). The first Basel accords were formed by negotiations in the late 1980s leading to the formulation of Basel I in 1988. The Basel Accords later evolved into Basel II with more strict requirements and more finely calibrated rules with regards to risks concerning investments and loans. As a result of the recent financial crisis in 2007-2009, the shortcomings of Basel II became obvious, leading to the formation of Basel III. However, some argue that the Basel III rules still are insufficient, in particular in terms of mitigating the systemic risk (Acharya et al. 2011).

Basel I and II

The aim of Basel I was primarily focused on the bank's capital levels with respect to its assets in order to mitigate the credit risk. Capital is expressed in different tiers, Tier 1 being the capital consisting mainly of paid-up shares, common stock, preferred stock and retained earnings. Tier II, on the other hand, consists of less reliable capital such as subordinated debt. Additionally, the Basel Accords introduced the concept of risk-weighting the assets. This means that the total assets of the banks are evaluated and weighted according to their risk. Examples of risk-weights are 0% for cash, 20% for claims on banks incorporated in the OECD and guaranteed loans and 100% for claims on the private sector. The concrete measure the Basel Accords mentions is primarily the Total Capital Ratio (Capital Adequacy Ratio) i.e. Tier I and II capital divided by the risk-weighted assets (RWA) of the bank. Basel I established requirements that the Total Capital Ratio should be minimum 8% of the bank's RWA of which 4% should be Tier 1 capital (BCBS 1988). Furthermore, Basel II developed the accords and divided the requirements into three pillars:

- 1) Bank's must maintain minimum capital amounts with respect to not only credit risk but also market and operational risk.

- 2) A framework is provided for managing different types of risks not included in the first pillar e.g. liquidity risk, legal risk and systemic risk.
- 3) The third pillar includes requirements for transparency towards shareholders and clients i.e. the banks are regulated to disclose information. (BIS 2013)

The Financial Crisis of 2007-2009

In the end of 2006, house prices in the US began to decline after a long period of rising prices, which had made it attractive to buy a house and take on a big mortgage. Many of these loans were classified as so-called sub-prime loans i.e. loans to people with lower credit rating (Norberg 2009). Housing prices kept increasing and banks were willing to provide mortgages without being able to foresee the decline in prices (Ordeberg 2010). When prices began to decline however, many defaulted on their loans, which led to problems for the banks that now experienced heavy credit losses (Acharya et al. 2011). Banks had been selling so-called mortgage backed securities (MBS) which are securities consisting of several thousands of mortgages which are put together. The MBSs were thought of low-risk investments as they could absorb credit losses from a few households due to its diversity. The MBSs were further converted into Collateralized Debt Obligations (CDO), which are constructed by purchasing large number of MBSs and repackaging them and selling the new security (CDOs) (Norberg 2009). In this process, the credit rating of the securities was often raised making investors believe it was a safer investment than it in reality was. 75 % of the repackaged CDOs were given the rating AAA although the underlying MBSs were only rated at a maximum BBB (Grant 2008). As a result, the risks were implicitly raised within the banking system.

Placing the securities in off-balance sheet vehicles, the banks were able to circumvent the Basel rules of capital requirements. These off-balance sheet vehicles operate under different rules and are separated from the bank. If the bank were to buy the securities, they would have to succumb to the Basel rules and use 8% capital of RWA. However, with off-balance sheet vehicles, banks only had to use 0,8% capital (Rausa 2004). These structural investment vehicles (SIVs) relied on short-term loans for their financing. However, in the end of 2007, as the rating institutes began to adjust their previous ratings downward, investors' willingness to provide these loans to SIVs

declined. The effect was that the banks had to finance these entities themselves, making them re-appear in the balance sheet. This led to large costs for the banks and many went into financial troubles (Norberg 2009). Officially, the 20 largest banks in the US exhibited capital ratios averaging 11,7 % i.e. well above the Basel requirements. Of these 20, five failed during the crisis, which indicates that capital requirements are not the only solution (Acharya et al. 2011).

As the bubble finally burst in the fall of 2008, it was made clear that the interconnectedness among the financial institutions had created a massive systemic risk (Acharya et al 2011). The banks had taken massive risks using off-balance sheet vehicles and because of herd-behavior, most of them had acted similarly and invested massively in MBS's and CDO's, which in the end turned out not to be as safe of an investment as it was thought to be (Acharya et al 2011).

The effects on the world economy were and still are massive. Many countries went into recession and the recovery is still continuing. Consequently, it was made clear that the existing rules for the financial sector were insufficient. As a result of the crisis, the Basel rules have been reviewed and the new Basel III rules were implemented starting in 2010. The transition period will then last until 2019 when the rules are to be fully implemented (Riksbank 2010).

Basel III

When the financial crisis of 2007-2009 hit, and the existing Basel II rules were proven insufficient to provide stability in the banking sector. As a response, the Basel III accords were implemented, starting in 2010 (Acharya et al. 2011). The objective of reforming the previously existing Basel II was according to the Basel Committee: "To improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source, thus reducing the risk of spillover from the financial sector to the real economy" (BIS 2010).

Although the Basel III rules are more ambitious than its predecessors in the pursuit of achieving stability in the financial sector, some major criticism against the new accords exist. Some of the most common criticisms are that the required capital ratios

are not sufficient and the requirements should have been stricter. Additionally, the new Basel III rules are most concerned with separate entities and thereby neglecting the systemic risk for the entire economy (Acharya et al. 2011).

Timetable of the Basel III Implementation in Sweden

	2013	2014	2015	2016	2017	2018	2019
Core Tier 1 Capital	Gradual 3.5%	Gradual 4.0%	Final 4.5%				
Tier 1 Capital	Gradual 4.5%	Gradual 5.5%	Final 6.0%				
Tier 1+2 Capital	Final 8.0%						
Capital Conservation Buffer				Gradual 0.625%	Gradual 1.25%	Gradual 1.875%	Final 2.5%
Liquidity Coverage Ratio	Observation	Observation	Final				
Net Stable Funding Ratio	Observation	Observation	Observation	Observation	Observation	Final	

Table II - The timetable for implementation of Basel III in Sweden – Illustrates when the different requirements are to be implemented (Riksbank 2011).

Framework of Basel III

Because of the obvious shortcomings of Basel II experienced during the recent financial crisis, Basel III tries to aim a bit differently. In general, the focus broadens from mainly emphasizing on capital requirements to focusing on more risk categories such as liquidity risk and problems with cyclicity. The Basel II did introduce more risk parameters, the concrete rules however were too basic in design, lacking in accuracy of how residual risk should be treated (Acharya et al. 2011).

Capital Requirements

The required Total Capital Ratio is increased, ranging from 8% to 10.5% of risk-weighted assets moving from Basel II to III. Tier 1 capital should constitute 6% of RWA. Core Tier 1 capital i.e. common equity should constitute 4.5% of RWA.

The forces of the financial crisis also indicated that basing capital requirements on risk-weighted assets was not flawless since it was fairly easy to manipulate these weights (Acharya et al. 2011). By introducing an additional type of capital requirement denoted leverage ratio, which is Tier 1 capital divided by total assets (not risk weighted), one can put constraints on excess leverage while not taking risk-weights into account. Additionally, the leverage ratio includes off-balance sheet exposures.

A capital conservation buffer is established where common equity should constitute 2.5% of RWA, in addition to the other requirements. This means that the Total Capital Ratio will range from 8 to 10.5% depending on the capital conservation buffer. In times of stress, this acts as a buffer and is rebuilt in better times.

Counter-Cyclicality

Another buffer introduced in Basel III is the countercyclical capital buffer. In addition to the other capital requirements, a buffer is established ranging from 0% to 2.5% of core Tier 1 capital. This will mitigate the problems of a negative liquidity spiral since banks are not obligated to hold as much capital in times of stress (Acharya et al. 2011). Furthermore, in better times, banks need to increase their core capital. This also serves as a braking effect on credit growth, which in turn results in a deceleration of the build up of systemic risk (Juks & Melander 2012).

The Three Pillars of Basel III

Pillar 1		Pillar 2	Pillar 3	
Capital	Risk Coverage	Containing Leverage	Risk Management and Supervision	
<p>Quality level of capital Greater focus on common equity</p> <p>Capital loss absorption at the point of non-viability Clause that allows relevant authority: write-off or conversion of capital instruments to common shares if the bank is judged to be non-viable. Lets private sector help resolve banking crises in order to reduce moral hazard</p> <p>Capital conservation buffer Common equity should constitute 2.5% of RWA. In times of stress, this acts as a buffer and is rebuilt in better times.</p> <p>Countercyclical buffer A range of 0-2.5% comprising common equity, higher requirements in better times and lower in times of stress</p>	<p>Securitizations Requires banks to conduct more thorough credit analyses of externally rated securitization exposures.</p> <p>Trading book Significantly higher capital for trading and derivatives activities, as well as complex securitizations held in the trading book.</p> <p>Counterparty credit risk Significantly strengthening the counterparty credit risk framework i.e. the risk that contract counterparties will not live up to their obligations.</p> <p>Bank exposures to central counterparties Trade exposures to a qualifying central counterparty will receive a 2% risk weight.</p>	<p>Leverage ratio A non-risk based form of capital ratio also including off-balance sheet exposures is added.</p>	<p>Supplemental Pillar 2 requirements: A number of residual risks have been taken into account including risk capturing off-balance sheet items and securitization activities.</p>	<p>Revised Pillar 3 disclosures requirements: A focus on disclosures related to off-balance sheet vehicles and securitization. Banks must provide disclosure for how regulatory capital ratios are calculated.</p>

Table III – The three pillars established in Basel II remain when moving into Basel III. The requirements within the pillars are further developed (BIS 2014).

Liquidity Requirements

Another important aspect of the Basel III, which is not explicitly explored in this study, is the concept of liquidity ratios. Two major liquidity ratios have been introduced in Basel III in order to address problems with liquidity. Their objective is to make banks more robust in distressed situations and mitigate the risk for bank runs.

1. The liquidity coverage ratio is designed to require the bank's high-quality liquid assets, such as cash and government securities, to exceed 100% of its net cash outflows e.g. outflows in retail deposits over a 30-day time period during a critical system-wide shock.
2. The net stable funding ratio is more long-term in its approach and addresses liquidity mismatches. This ratio denotes that the bank's available amount of stable funding (e.g. capital and longer-term liabilities) should exceed 100% of its required amount of stable funding, which is the value of held assets multiplied by a factor representing the asset's grade of liquidity (Acharya et al. 2011) (BIS 2013).

Major Criticisms Against the Basel Rules

The Basel III rules were developed as a response to the financial crisis of 2007-2009 when it became clear that the previous Basel II framework was not sufficient to provide stability in the banking sector. Although the new rules have sharpened the requirements the banks have to succumb to, major criticisms exist, particularly concerning the capital requirements and the neglecting of the systemic risk (Admati & Hellwig 2013). The Basel III accords have received critique regarding the fact that the rules consider banks separately, thereby failing to address the systemic risk of the interconnectedness in the banking sector (Acharya et al. 2011).

The new rules also fail to address the problems concerning the shadow-banking sector that was highly involved in the crisis of 2007-2009 and the possibility for banks to circumvent the new rules, in a manner described as regulatory arbitrage, still exists. The focus on the separate firm, rather than the sector as a whole makes it possible for banks to act as before and put some of its operations off-balance sheet (Acharya et al. 2011).

Admati & Hellwig (2013) claim, “the new reforms that are being put in place are far from satisfactory” regarding the robustness of the banks. The required capital ratio of 10.5% has been deemed insufficient and capital ratios of between 20-30% have been proposed to prevent future financial crisis and provide stability to the banking sector (Admati & Hellwig 2013). These much higher capital ratios would help stabilize banks but proposals of this kind are often met with skepticism from bankers, claiming that this would lead to increased funding costs (Admati & Hellwig 2013).

The risk weighted assets (RWA) and how these are calculated are problematic since it is possible for banks to manipulate the risk-weights making it possible to circumvent the rules. The Basel III rules suffer from the same problems as their predecessors as it is difficult to follow and regulate the many complex trades in the financial markets, involving for example insurances such as CDSs. Through different trades, banks are able to effectively raise their leverage ratio above the stipulated levels without breaking the actual Basel III rules (Blundell-Wignall & Atkinson 2010).

In summary, the criticism against the new regulation is mainly that the problems that led to the financial crisis will still not be resolved by the new Basel accords.

Systemic Risk Impact

Addressing the systemic risk impact, the changes from the previous Basel II include that banks should have a certain capital ratio in relation to their systemic importance (Georg 2011). Large financial institutions that are considered as globally systemically important financial institutions (G-SIFI) are forced to keep an additional capital buffer of 1,0-3,5 % of core Tier 1 capital depending on how systematically important the bank is considered (Schuster et al. 2013)

Some scholars argue that the new accords are not sufficient in targeting systemic risk. The systemic risk also involves the explicit or implicit guarantees given by governments to bail banks out in times of stress. As long as these guarantees are present, banks will have an incentive to gain status as systematically important. However, the Basel III does not consider government guarantees to a large extent (Acharya et al. 2011). In order for the requirements to be effective, they must generate higher costs for the banks than the possible gains from a government bail-out and thereby effectively removing the incentive to become systemically important and gain

status as “too big to fail”. Even if the Basel regulation have taken steps in this direction with the Basel III accords, the role of government guarantees is largely neglected and banks still have an incentive to become systemically important (Georg 2011).

Theory

Cost Impact - How Does Basel III Affect Costs for Banks and Society?

An OECD working paper (Slovik & Cournède 2011) argues that GDP growth levels will diminish by 0.05 to 0.15 percentage points per annum as an effect of larger loan interest spreads set by banks. This, in turn, is a direct reaction to increased funding costs originated from the increased capital requirements. Aside from Slovik and Cournède (2011), there are several other studies indicating that higher capital ratios lead to higher interest rate margins (Cosimano and Hakura 2011) (Roger and Vlcek 2011) (Elliot 2009 and 2010b) (Angelini et al. 2011). This conclusion contrasts with the Basel Committee’s view of the cost effects, instead they argue that changes in a firms funding should not affect the funding cost (Gual 2011). The theoretical backbone of this argument is that according to the basic Modigliani Miller theorem (MM) (Modigliani and Miller 1958), the costs of funding a firm are independent of the firm’s financing structure. However, it should then be emphasized that this theory is based on the assumption of frictionless environments, which may not hold in reality. A common argument is that there are several frictions that will not make the basic MM model applicable (Jaffee and Walden 2010) (Gual 2011). The following factors serve to prove that we cannot ascertain that financial structure has no effect on funding costs.

Factors making debt preferable to capital

1. In levered firms, corporate taxes will affect the bank’s financial status leading to debt being advantageous in contrast to capital. This situation is explained in the further developed MM model with corporate taxes. The net income of a company will determine the corporate tax level of the firm. However, interest rates on loans are tax deductible. This means a tax-shield will arise when a substantial part of the revenue

the taxes are based on is deducted, leading to decreased tax payment compared to that of an unlevered firm (Hillier et al. 2013 p.419 pp) (Modigliani & Miller 1958).

More formally, the elaborated Modigliani Miller theorem with corporate taxes (Proposition II) (Modigliani & Miller 1958) shows the factors determining the funding costs:

$$R_{wacc} = \frac{S}{V_L}R_S + \frac{B}{V_L}R_B(1 - t_C)$$

where:

R_{wacc} = Weighted average funding cost of the firm

$\frac{S}{V_L}$ =Ratio of equity to total assets

R_S =Cost of equity

$\frac{B}{V_L}$ =Ratio of debt to total assets

R_B =Cost of debt i.e. interest rates to debt holders

$(1 - t_C)$ =1-The marginal corporate tax

The equivalent equation for the basic MM without taxes (Proposition II) is the same as the equation above, except that the term $(1 - t_C)$ is absent. The difference between the two equations implies that when corporate taxes are involved, the tax term decreases the funding cost.

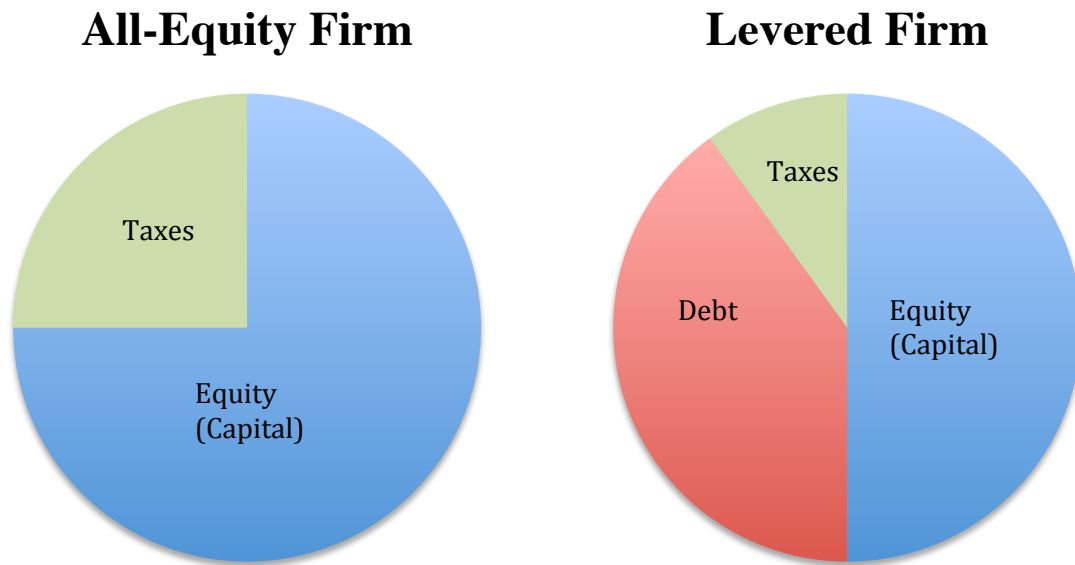


Figure IV - Shows the difference of firm value between levered and unlevered firms when corporate taxes are included. Debt is tax-deductible leading to a larger value of the levered firm compared to the unlevered after taxes have been paid.

2. Another factor not included in the MM model is the presence of asymmetrical information. This means that the firm's shareholders do not have access to the same information as the managers. This can significantly increase the funding costs. In contrast to debt, the stock market is highly sensitive to information. One example of the impacts of asymmetrical information is when raising new equity; this signals that the firm is in poor condition, even if this is not the case, which can lead to a decrease of the firm's market value (Myers and Majluf 1984).

3. Government guarantees will make equity disadvantageous in contrast to debt. This is because borrowing becomes comparably cheap when the bank to some extent is secured against the risks of borrowing. Government guarantees protect the firms from bankruptcy. Since one important downside of debt is the increased risk of bankruptcy, this risk is therefore diminished because of the guarantees. This also means that the banks investors demand a lower risk premium, which leads to lower funding costs. Hence, debt becomes comparably advantageous to capital (Jaffee and Walden 2010).

Factors making capital preferable to debt

1. Expected bankruptcy costs will decrease as capital levels increase. This is because of the cushion-effect of greater capital levels i.e. higher capital ratios decrease the default risk (Gual 2011). However, it should be noted that this factor is at odds with the previously explained factor. Government guarantees create a moral hazard and remove the risks of borrowing.
2. When a firm is relatively heavily indebted, new investment opportunities may be disregarded because of the return of the investment directly going to debt holders (Jaffee and Walden 2010).

The trade-off theory of capital structure argues that when deciding on an optimal capital structure, there is a trade-off between the benefits and risks of funding with debt. Initially, when an all-equity firm starts to borrow, the average funding costs decrease. However, after a certain point, the present value of bankruptcy costs supersedes the benefits of the tax shield (Figure V). Formally, this point is where the marginal costs of financial distress equal the marginal tax shield (Hillier et al. 2013). One could argue however, that a financial firm that is protected under government guarantees does not face the same expected level of distress costs. This is because the firm does not longer face these expected costs by itself. Instead the government removes the risk from the bank leading to the bank's funding costs not increasing, see Figure VI. This could create incentives for the banks to strive for a high debt level. However, this could be hard to validate empirically. Furthermore, the guarantees create a moral hazard leading to increased risk-taking by the banks, which causes the government being exposed to the risk created by the banks.

Trade-Off Theory - Funding Costs as Debt Increases

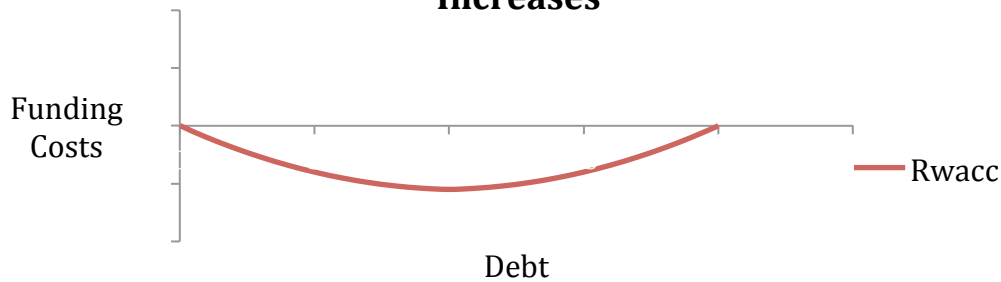


Figure V – Shows the changes in funding costs as debt increases in relation to equity according to the trade-off theory

Possible Outcome under Government Guarantees - Funding Costs as Debt Increases

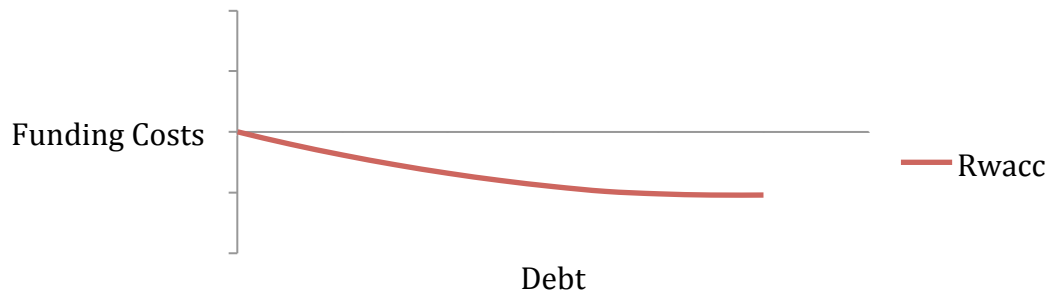


Figure VI – It can be argued that when banks are protected under government guarantees, their expected bankruptcy costs cease to exist, preventing the funding costs to increase after a certain point.

Some scholars argue that capital is expensive compared to debt because shareholders require higher returns than debt holders (Admati & Hellwig 2013). In other words, interest rates on loans are lower than shareholders' required rate of return. Admati & Hellwig (2013) criticize this view in two concrete ways: The required rate of return depends on the level of risk of the investment. The costs of equity cannot be considered separately without referring to a mix of debt and equity. This statement means that if a firm has a higher leverage, the stock investment will be higher in terms of risk. If this is the case, the required rate of return will also be higher. This means that for a firm with lower leverage, and thus higher capital, the equity investment is less risky; hence the required rate of return should be lower as well.

Although the banks' financial status could benefit from higher debt levels through tax-shields while circumventing much of the natural risk associated with high debt levels, the costs of state guarantees are high for taxpayers when banks need to be bailed out by the government. As an example, the US Trouble Assets Relief Program (TARP) that was launched in the fall of 2008 cost the government, and hence the taxpayers, 700 billion USD (Norberg 2009). This is only one of many cases of social costs following the financial crisis. If the crisis would have been prevented, this money could have been used to a greater good for society.

Methodology

In order to measure the banks' interest margins, the Net Interest Margin (NIM) is used as the dependent variable. A fixed effect regression using panel data is advantageous for analyzing the effect on the Net Interest Margin of the banks. This model is preferable because it allows us to control for and remove unobserved factors over time; the regression term is denoted α_i . It also makes it possible to study a number of banks over time and obtain unbiased estimators of the beta-coefficients. To avoid serial correlation and heteroscedasticity, robust standard errors have been used in the regressions. The avoidance of serial correlation and heteroscedasticity are one of the criteria that has to be met to be able to use a fixed effects model, the other is that there has to be variance in all the independent variables in the regression, as these would otherwise have been eliminated in accordance with the fundamental function of the model. Time dummies are included in order to capture omitted time effects on the dependent variable in the regression; these include several unobserved macroeconomic effects on interest margins. In order to obtain adequate estimators of the variables, some of them have been lagged one quarter. A negative aspect of using lagged variables is the reduced degrees of freedom. However, some of the variables require lags of one quarter in order for the banks to analyze the changes and respond by changing the interest margin.

Sample

The Swedish banking sector is particularly interesting to study because the sector is comparatively large in relation to the Swedish economy. The banking sector in Sweden is dominated by four major actors; Nordea, Svenska Handelsbanken, SEB and Swedbank, which together make up for around 75 % of lending and deposits in Sweden and are also highly interconnected (Ingves 2011). This is why the research focuses on these banks. We use quarterly data from 2009 to first quarter of 2014 in order to be able to observe interesting changes in bank behavior over time in response to the capital ratios defined in the Basel III rules and banks' equity ratios not using risk-weights. However, since the Basel III rules are not fully implemented until 2019 this paper aims to provide an initial analysis. Thus, the final evaluation cannot be made before we can investigate the effects of the complete implementation. The data is mostly obtained from Bankscope but also from the Swedish Riksbank. Furthermore, some of the raw data have then been further elaborated and refined. These regressions are based on 83 observations. This is because only 4 major actors heavily dominate the banking market in Sweden. Furthermore, the 5-year time period was chosen to examine banks' behavior after the financial crisis and to be able to observe the adaptation to the Basel III capital requirements and how this affects interest margins.

Dependent Variable

Net Interest Margin

The Net Interest Margin (NIM) is defined as the difference between the bank's interest earnings and interest expenses, divided by the amount of interest earning assets. The NIM should act as an indicator of how much the banks adjust their interest margin as an effect of costs resulting from capital ratios imposed by the Basel III rules and/or other factors.

$$NIM = \frac{I_{earn} - I_{exp}}{IEA}$$

Independent Variables

Total Capital Ratio

The Total Capital Ratio measures capital in relation to risk-weighted assets. As concluded by Slovik and Cournède (2011) as well as the recent Finansinspektion report (2014), the coefficient is expected to be positive as a result of higher funding costs, leading banks to increase their interest margins.

Tier 1 Capital Ratio

The Tier 1 Capital Ratio is similar to the Total Capital Ratio with the difference being that the capital mainly consists of common stocks and retained earnings. Consequently, the coefficient is expected to be similar to that of the Total Capital Ratio.

Equity Ratio

The Equity Ratio is used in order to test the capital to total assets without taking risk-weights into consideration; this is therefore useful in testing the Modigliani Miller theorem with corporate taxes and to a certain extent the trade-off theory. The Equity Ratio is similar to the leverage ratio of Basel III in the sense that the capital is measured in relation to the total assets, not taking risk-weights into account. The variable coefficient is expected to be positive. This would indicate that an increase of capital in relation to debt would increase the funding costs, as explained by the MM proposition II with corporate taxes. Thus the banks are expected to increase their interest margin. The variable is measured as equity/total assets.

Control Variables

Credit Risk

Financial firms with a high share of loans to total assets face an increased risk that debtors will fail to pay back their loans. Therefore, the variable loans to total assets ratio is used as a proxy for credit risk, which is the same proxy used by Maudos & de Guevara (2004). The variable will be lagged because credit risk does not tend to affect the margins immediately (Valverde & Fernández 2007). Additionally, it is logical to assume that there is some uncertainty to how much the bank will lend in a certain period of time. Thus, they do not know how much they have lent until the end of the period observed. When they do have data at the end of the period they can adjust their margin decisions accordingly. The assumption behind this variable is that the higher the risk, the higher the Net Interest Margin, because banks have to be compensated for the increased risk (Angbazo 1997). Therefore it is expected that the coefficient will be positive.

Standard Deviation of the Swedish Interbank Rate Stibor

Using the standard deviation of the Stibor rate will generate a good measurement of the volatility in the interest rates. The standard deviation of the Stibor rate is measured in three variables with different maturity: 3-months, 1-month and 1-week. The idea of this is to account for that the banks have different maturities on their assets and liabilities. The standard deviation is calculated on the mean of the specific quarter on a daily basis. It is expected that higher volatility in the Stibor rate will lead to an increased market risk for the banks. This is why the effect is expected to be positive (Maudos & de Guevara 2004). This variable will have a one quarter lag since the banks respond to the outcome of the previous risk when they determine their present Net Interest Margin. It is difficult to observe the market volatility as it happens.

Credit Risk*Stibor 3m SD

The interaction term between credit risk and the standard deviation of the Stibor 3-month rate is used because it can be expected that the market risk, measured by the

standard deviation of Stibor, can have an effect on the credit risk, which in turn will affect the Net Interest Margin (Maudos & de Guevara 2004). The effect of this variable is expected to be positive, as a larger risk will cause the bank to increase the Net Interest Margin. Because of the lag on credit risk and market risk individually, this is why the interaction term is lagged.

Liquidity Risk

Liquidity risk is measured by dividing the bank's liquid assets with its deposits and short term funding. As financial firms can quickly borrow money in the money market, this variable will not be lagged in the same way as the credit risk.

Furthermore, since banks must have a certain ratio of capital relative to the borrowed funds, banks that have a large liquidity risk are assumed to increase their Net Interest Margin in order to increase their capital (Valverde & Fernández 2007). The variable coefficient is expected to be negative because if the ratio decreases, liquidity risk emerges, which causes the banks to increase their interest margins.

Interbank Ratio

The Interbank Ratio is measured as the ratio between lending assets and borrowed assets in the interbank market. If a bank is solid and has a high degree of liquidity, it is expected that this bank will have a positive ratio as it can lend more than it borrows from other banks. This will in turn lead the coefficient of the variable to be negative as a solid bank faces less risk and therefore does not have to increase the Net Interest Margin in order to increase liquidity.

Year Dummies

In order to record unobserved time-varying effects, year dummies are included in the regression. The year dummies can capture effects such as macro factors that are not included in the model but still have a significant effect on the Net Interest Margin. The base year of the year dummies will be 2009 which all unobserved macroeconomic characteristics will be relative to.

Regressions

Three different fixed effect regressions have been run in order to control for each capital ratio separately. All three regressions use the same control variables and the only difference is the independent variable. The first regression uses the Total Capital Ratio as the independent variable and it can be expressed as:

$$NIM_{it} = \delta_0 + \beta_1 TCR_{it} + \beta_2 Crisk_{it-1} + \beta_3 Lrisk_{it} + \beta_4 Interbank_{it} + \beta_5 SDStibor3m_{it-1} + \beta_6 SDStibor1m_{it-1} + \beta_7 SDStibor1w_{it-1} + \beta_8 Crisk * SDStibor3m_{it-1} + a_i + u_{it}$$

In the second regression, the Tier 1 Capital Ratio is the independent variable:

$$NIM_{it} = \delta_0 + \beta_1 T1CR_{it} + \beta_2 Crisk_{it-1} + \beta_3 Lrisk_{it} + \beta_4 Interbank_{it} + \beta_5 SDStibor3m_{it-1} + \beta_6 SDStibor1m_{it-1} + \beta_7 SDStibor1w_{it-1} + \beta_8 Crisk * SDStibor3m_{it-1} + a_i + u_{it}$$

The third regression includes the Equity Ratio as the independent variable:

$$NIM_{it} = \delta_0 + \beta_1 EqR_{it} + \beta_2 Crisk_{it-1} + \beta_3 Lrisk_{it} + \beta_4 Interbank_{it} + \beta_5 SDStibor3m_{it-1} + \beta_6 SDStibor1m_{it-1} + \beta_7 SDStibor1w_{it-1} + \beta_8 Crisk * SDStibor3m_{it-1} + a_i + u_{it}$$

The term a_i includes unobserved effects omitted in the model. These effects are constant over time but differ across banks. The error term, u_i must be uncorrelated with the explanatory variables.

Results and Analysis

Table VII presents the results of the three regressions using different capital ratios as dependent variable. Some of the results are interesting and especially worth noticing. In all three regressions, the control variable *Interbank Ratio* is significant and has a negative coefficient, which is the same effect as anticipated. The control variable *Credit-Risk*Stibor3mSD* is statistically significant in two of the regressions indicating that the market risk has an effect on the dependent variable through the credit risk. The effect is, as anticipated, in both cases positive. Among the independent variables, only *Equity Ratio* is proven to have a significant effect on *Net Interest Margin*. The R-square value of the three regressions is constant around 0,6, which means each of the theoretic models has an explaining effect of around 60% of the variance in the Net Interest Margin.

The results presented account for data from 2009 to the first quarter of 2014. This means that we cannot draw any conclusive evidence concerning the effects of the Basel III rules. The complete analysis cannot be made until after the full implementation in 2019. These results act as an initial analysis of the impacts of capital requirements imposed by Basel III on interest margins of the four major Swedish banks.

Effects of capital ratios on interest margins

	Dependent variable: Net Interest Margin		
	(1)	(2)	(3)
Total Capital Ratio	-0.0213 [0.0205]		
Tier 1 Capital Ratio		0.0057 [0.0092]	
Equity Ratio			0.0672 [0.0110]**
Credit Risk	0.0085 [0.0066]	0.0058 [0.0071]	0.0043 [0.0049]
Liquidity Risk	-0.0020 [0.0013]	-0.0018 [0.0013]	-0.0014 [0.0012]
Interbank Ratio	-0.0010 [0.0002]**	-0.0010 [0.0002]***	-0.0011 [0.0002]**
SD Stibor3m	1.0549 [0.3974]*	0.9146 [0.5606]	0.6299 [0.6800]
SD Stibor1m	-0.3778 [0.7345]	-0.1765 [0.7240]	-0.4737 [0.4960]
SD Stibor1w	0.4558 [0.5247]	0.3467 [0.4884]	0.5783 [0.2902]
Credit Risk*SD Stibor3m	-0.0173 [0.0040]**	-0.0159 [0.0062]*	-0.0100 [0.0098]
Year 2010	-0.1188 [0.0369]**	-0.1165 [0.0544]	-0.1211 [0.0506]
Year 2011	-0.0548 [0.0574]	-0.0385 [0.0552]	-0.0480 [0.0511]
Year 2012	0.0104 [0.0809]	0.0097 [0.0876]	-0.0024 [0.0866]
Year 2013	0.0605 [0.0761]	0.0753 [0.0760]	0.0407 [0.0866]
Year 2014	0.1948 [0.1329]	0.0060 [0.0907]	0.0217 [0.0654]
R-squared (within)	0.6218	0.5821	0.6057

*Table VII - Illustrates the three regressions including dependent, independent and control variables. Standard errors are presented in parentheses. Number of observations: 83 Significance levels are denoted as: *=10% **=5% ***=1%*

Total Capital Ratio – Regression 1

The results of Regression 1, using the total capital ratio as the independent variable, are presented in Table VII. The coefficient of Total Capital Ratio is insignificant, this implies that there is no statistical evidence proving a correlation between the capital ratio based on risk weighted assets and the banks' interest margins. Regarding the control variables, the standard deviation of the Swedish interbank rate, capturing the effect of market risk, shows statistical significance in this regression. Interbank Ratio and the interaction term between market and credit risk also shows significance. The results of Regression 1 imply that the examined Swedish banks do not change their Net Interest Margins when the Total Capital Ratio changes. The reason behind this is further discussed below. The R-squared of Regression 1 is 0.6218. This implies that the regression model explains 62.18% of the variation in the dependent variable i.e. Net Interest Margin.

Tier 1 Capital Ratio – Regression 2

Similar to the regression above, there is no statistical significance in the coefficient of the Tier 1 Capital Ratio, which is the independent variable of Regression 2 presented in Table VII. The fact that this variable is not statistically significant indicates that banks do not change their interest margins following changes in their Tier 1 Capital Ratio. The reason behind the insignificance in the independent variables of Regression 1 and Regression 2 respectively might be that banks can change their capital ratios through adjusting their risk-weighted assets without having to change their funding i.e. how much debt in relation to capital the bank has (capital structure). The capital structure is the sole determinant of differences in funding costs according to the specialized MM model with corporate taxes (Proposition II) and since the capital structure does not have to change when the ratios based on risk weights do, this can explain the insignificance in the variable coefficients. The regression model explains 58.21% of the variation in the Net Interest Margin.

Equity Ratio – Regression 3

The third regression including the *Equity Ratio* as the independent variable shows that the coefficient of the *Equity Ratio* is significant at the 5% level. The coefficient of the independent variable *Equity Ratio* is 0,0672, which implies that a 1% increase in equity ratio will result in a 0,07% change in the Net Interest Margin. This effect is not an exceptionally large economical effect although it cannot be neglected. This result is aligned with the findings of Angbazo (1997). He found a positive relationship between core capital to total assets and the Net Interest Margin. The Equity Ratio is the only capital ratio that empirically supports the claim that higher capital ratios lead to increased interest margins. In contrast to the two previous regressions, this supports Proposition II of the MM model with corporate taxes. When the Equity Ratio increases, debt subsequently decreases leading to rising funding costs. This in turn makes the banks increase their interest margins. In order to understand why the Equity Ratio has an effect on interest margins and not the other capital ratios, the differences between the ratios must be clarified. Total Capital Ratio and Tier 1 Capital Ratio are calculated using risk-weights. Equity Ratio, on the other hand, is calculated using total assets without taking risk-weights into account. This implies that the Total Capital Ratio and Tier 1 Capital Ratio can be changed without explicitly changing the capital structure of the firm. For example, if the firm chooses to restructure its assets and thereby changing its average risk-weights, the Total Capital Ratio as well as Tier 1 Capital Ratio would change as well, even though the capital structure of the firm would not change. One should note that the MM model with corporate taxes only takes capital structure into consideration when explaining differences in funding costs. Therefore, with respect to the MM model with corporate taxes, it is logical to conclude that the Equity Ratio is the only one of the capital ratios that shows a significant effect on margins since it is the only capital ratio implying that when this ratio falls, debt must increase at the same time.

Control Variables

The Interbank Ratio is the only one of the control variables that has a statistically significant effect in all the three regressions. In all models, the effect of the Interbank Ratio is -0,001 which means that an increase in the Interbank Ratio with one percentage point will result in a decrease in the banks' interest margin with -0,001 percentage points. The effects are in line with the expectations. An explanation for this effect is that if the bank increases borrowing from other banks in relation to lending, the bank is facing an increased risk. The bank compensates for this risk by increasing their interest margins. However, although the statistical significance is especially high in these coefficients, it should be noted that the economical significance is not very large.

The interaction term between market risk and credit risk implies that there is significance in two of the regressions. This means that although credit risk is insignificant by itself, it becomes statistically significant when multiplied by market risk. This can be interpreted as market risk having an effect on credit risk, which in turn has a positive effect on interest margins.

The liquidity risk is not significant in any of the regressions. However, one could argue the Interbank Ratio also is a type of liquidity risk; it only measures another aspect of the risk. Consequently, this would still support the claim that liquidity risk is a significant factor in determining interest margins.

Only one of the market risk factors in one of the regressions shows significance in the effect on interest margins. A reasonable explanation for the lack of significance might be that the analysis only contains 5 years of observations, which limits the fluctuations in the variables (Francis & Osbourne 2009).

Conclusion

Capital ratios calculated using risk-weights do not seem to have a significant effect on interest margins for the four largest banks in Sweden. However, the Equity Ratio calculated on total assets, using no risk-weights, has a positive effect on interest margins in the Swedish banking market. This empirically provides support for the specialized Modigliani Miller theorem with corporate taxes.

Firstly, it has to be emphasized that the results cannot be interpreted as empirical evidence of the impacts of Basel III. This is because the implementation of the Basel III rules is merely in its starting phase. However, the results can give us a guideline as to what impact fluctuations in capital ratios have on banks' interest margins of the largest LCFIs in Sweden.

The results suggest we can find empirical evidence that the MM model with corporate taxes holds in the Swedish banking sector. It should be stated that the elaborated MM model suggests that it is the mix of debt and capital (capital structure) that decides the value of the firm and funding costs, through an emerging tax shield. Accordingly, the results do imply that changes in the Equity Ratio impact the interest margins of the banks. These findings are also in line with the study by Angbazo (1997), where a positive correlation between core capital to total assets and Net Interest Margin is established. However, the Total Capital Ratio and Tier 1 Capital Ratio defined in Basel III are based on risk-weights, which means that it is possible for the ratios to change without actually changing the mix of debt and capital. The results show that there is no significant correlation between the capital ratios based on risk-weights and interest margins. In contrast, it can be concluded that capital ratios, where changes in the capital ratio directly affects debt levels, have a significant effect on interest margins of the investigated Swedish banks. Furthermore, studies such as Slovik & Cournéde (2011), Elliot (2009 and 2010) and Angbazo (1997) contribute with an explanation to the correlation between capital ratios and interest margins being that the higher funding costs resulting from higher capital ratios, in turn affect the interest margin.

The fact that the regressions merely are based 83 observations in the Swedish banking market could mean that the results are not generalizable in a broader banking context. It is suggested that the same study is made internationally after the Basel III rules are fully implemented in order to achieve a fair conclusion of the impacts of the capital requirements of Basel III.

Further Research

It is of high importance that further studies are made after the implementation process of Basel III. The results of this study should not be viewed as the impact of the new Basel rules because the implementation of the Basel III rules to this date only is in its starting phase. Additionally, macroeconomic analyses can be made in order to measure the differences in economic growth after the new Basel rules are implemented. Basel III may contribute to significant changes in the economy. Therefore, aside from studying the cost effects of more stringent capital requirements, it is beneficial to explore other effects of Basel III. For instance, studies could be made on the systemic risk impact of Basel III and further investigate solvency and liquidity of banks.

This study is focused on the different capital ratios defined in the Basel III rules. However, another equally important aspect of the rules is the liquidity regulations. Since this type of regulation differs considerably from capital ratios and that they form a new type of bank regulation means that it is vital to examine the effects of these measures as well as the capital ratios,. The effects of the liquidity ratios on banking behavior and costs for banks and society are suggested as further research.

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