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The Effects of Capital Structure on Loan Rates and Loan Growth

Empirical study of the four main Swedish banks

Caroline Eriksson
22043@student.hhs.se

Karin Kans
21760@student.hhs.se

Abstract

This study examines the effects of bank capital structure on loan rates and loan supply for the main four Swedish banks. The objective is to explore whether the heightened capital requirements stipulated by the Basel III Accord will affect customers of the banks. Fixed effects regressions are run on quarterly bank data from 2002 to 2013, and loan yield, net interest margin and growth in loans are each used as dependent variables. The independent variables are various capital ratios, which are defined and regulated by the Basel Accords, as well as corresponding capital surplus ratios. The results indicate a modest but positive correlation between capital ratios and loan yield, but no correlation with net interest margin. Furthermore, the results suggest that the level of bank capital surplus is positively correlated with yearly growth in loans. That is, banks with excess (deficit) capital in relation to what is stipulated under the Basel regulations will allow loans to grow more (less). Even though the results suggest that heightened capital requirements would have negative impact for customers, these are assessed to be small. Given our results as well as the specific risks of the Swedish banking system, we conclude that the Basel III regulations are justified.

Keywords: Bank capital ratios, Bank capital surplus, Basel III, Loan rates, Loan supply

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CONTENT

INTRODUCTION

In the wake of the recent financial crisis, the Basel Committee for Banking Supervision decided to stipulate new regulations for the banking sector. The purpose was to ensure that banks would be better prepared to handle operating losses, in order to prevent history from repeating itself. The main focus of the capital reform, called the Basel III Accord, was enhanced quality and depth of capital (Basel Committee on Banking Supervision, 2013).

Even though the regulations are intended to substantially contribute to the long-term financial stability, some critics perceive them as a possible cause of lower credit supply and higher interest rates (Elliot, 2009). In Sweden however, authorities have assessed the Basel rules to be inadequate for the Swedish banking system and have stated that the main banks should have capital ratios in excess of what is stipulated under the Basel III Accord.

The aim with this study is to estimate historical effects of capital requirements in order to understand the effects of heightened capital ratios on loan rates and loan supply. More specifically, two questions about the four main Swedish banks will be asked. First, *what is the effect of bank capital structure on loan yield and the net interest margin*? Second, *what is the effect of bank capital surplus on loan supply?*

The first question regarding the effects of bank capital structure on loan rates has been the focus in a range of prior studies. Kashyap, Stein and Hanson (2010) calibrated that the cost of capital would increase with higher capital requirements in the US market. Their findings are supported by research with data from various other countries. MAG[1] (2010b) for example, estimated that increased target capital ratios would increase lending spreads for banks in a selection of advanced economies, including the Euro area and the US.

In addition to these calibration and simulation models, econometric analyses have been conducted in the subject. Alfredo, Ruano and Salas-Fumás (2013) for example, found that loan yield is positively correlated with bank capital ratios for Spanish banks.

The second question regarding the effect of bank capital structure on loan supply is also a highly explored subject. Berrospide and Edge (2010), as well as Francis and Osborne (2009) concluded that banks in the US and the UK with capital in excess of their targets tended to have higher growth in loans. Elliot (2009, 2010) also predicted that higher capital requirements would decrease loan volumes moderately in the US. Furthermore, Bernanke and

[1] The Macroeconomic Assessment Group (MAG) was established in February 2010 by the chairs of the Financial Stability Board and Basel Committee on Banking Supervision to coordinate an assessment of the macroeconomic implications of the Basel Committee's proposed reforms.

Lown (1991) found that the bank size seems to have impact on the banks' level of adjustment. Their research revealed that shortage of capital reduced lending for small banks in New Jersey banks, while this relationship did not hold for large banks in the same area.

In this study we extend previous research by applying already established empirical methodologies to study Swedish banks. This has, to our knowledge, not yet been done. The Swedish banking system differs in many aspects compared to other countries. Thus, our findings will be useful to predict how the Basel regulatory requirements will affect the Swedish economy specifically. Furthermore, the time period we study, from year 2007 to 2013, is characterised by significant amounts of economic turbulence. This means that our results will illustrate the effects of bank capital on loan rates and loan supply in a unique economic environment. We also make our model more specific by including common equity Tier 1 capital ratio, Tier 1 capital ratio, and total capital ratio, which are the specific ratios defined and regulated by the Basel Accords.

To investigate our stated thesis questions, we set up a number of bank fixed effects regressions and control for bank and macro characteristics as well as heteroskedacticity.

The regressions we use to test how bank capital ratios affect loan rates are inspired by Kashyap, Stein and Hanson (2010). The dependent variables are either the loan yield or the net interest margin while the Basel capital ratios, as well as the equity to assets ratio, are used as independent variables.

When we use the Tier 1 capital ratio and common equity Tier 1 capital ratio as independent variables, we find positive, statistically significant and robust relationships with the loan yield. Still, our results suggest that the actual economic importance is modest. These findings are consistent with research performed by Alfredo, Ruano and Salas-Fumás (2013) and Elliot (2009, 2010) who all find positive but modest relationships between bank capital structure and loan yields.

Our regressions with net interest margin as the dependent variable yields insignificant results, which contradict the findings of the majority of prior studies (Ho and Saunders, 1981, Allen, 1988 and Saunders and Schumacher, 2000). This suggests that Swedish banks increase loan yields but leave margins unchanged.

The regressions we use to test how bank capital surplus affect loan supply are inspired by the study performed by Berrospide and Edge (2010). The dependent variables are either yearly growth in loans or quarterly growth in loans. The independent variables are four definitions of capital surplus ratios based on the applicable Basel regulatory requirements and internal target ratios of the banks. Our results suggest that higher total capital surplus and Tier

1 capital surplus ratios have positive effects on the level of growth in loans, but only within a one-year horizon. This means that if banks adjust their level of loans in accordance with heightened capital requirements, the change will occur but not instantly. Prior studies, such as Berrospide and Edge (2010) and Francis and Osborne (2009) find a more instant impact.

Our main findings are that Swedish banks have adapted loan rates and loan supply in accordance with heightened capital requirements stipulated by the Basel Accord. We believe that one reason for the smaller correlations in our results compared to prior studies is due to the specific characteristics of the Swedish banking industry. The Swedish banking system resembles an oligopoly, in which there are four major banks that dominate the market (Sveriges Riksbank, 2013b). As the competition is relatively low, the interest rates on loans are not likely to be completely competitively priced (Sjöblom, 2013). Thus, an increase in the funding cost does not have to correspond to equivalent changes in prices. Another reason as to why our findings are not as strong as in previous research is due to the turbulent time period we study. There are several exogenous factors occurring, such as the financial crisis starting in 2008, changes in calculation methods of risk-weighted assets as well as high credit losses due to the Swedish banks' presence in the Baltic region, which may have altered our results (Sveriges Riksbank, 2010b, DN Debatt 2013). A third reason is that the Swedish banks are well-capitalised to begin with, in which they are not forced to take drastic action in order to comply with new capital requirements (Gambacorta, 2004).

One weakness with this study is that it assumes that bank specific targets are transparent, when they actually are set unofficially by the Swedish Financial Stability Agency (Johanna Eklund and David Forsman, personal communication, 2013-11-29). Thus, the Swedish banks may adjust to undisclosed higher requirements rather than those stipulated by the Basel Accords. Furthermore, we are unsure whether the banks establish capital policies based on current regulations as in our model, or if they adjust to future expectations on capital requirements. These two factors may cause our thesis to overestimate banks' capital surpluses and thus underestimated the actual effects on loan supply.

Since the Basel III regulations will be implemented gradually over many years and since the potential negative effects are estimated to be small, we assess that the main Swedish banks will be able to adapt to the Basel III regulations successfully without severely affecting customers. Incorporating the social benefits that come from a more stable financial system in Sweden into our analysis, we conclude that the heightened capital requirements are justified.

THEORETICAL BACKGROUND

THE BASEL I AND BASEL II REGULATIONS

The capital structure of a bank is typically made up of a mix of equity and debt. The equity consists of nominal share capital as well as retained earnings that come from profits of the bank's operations. If the customers of a bank default on their loans, the bank will lose money. In the best-case scenario, the equity of the shareholders works as a buffer, and will be adequate to cover losses from defaults. This means that a bank with more equity are more likely to be able to handle economic downturns than a bank that does not have the same capital levels. With respect to this, financial regulators find it necessary to specify requirements on the minimum levels of capital that banks need to hold, in order to avoid financial distress in case of operational losses (Sveriges Riksbank, 2010a).

The Central Bank governors of the G10 countries established the Basel Committee on Banking Supervision (BCBS) in 1974. Albeit the fact that the Basel Committee does not have any legal rights to stipulate how banks are to be run, each national authority will generally implement the guidelines into national legislation (Basel Committee on Banking Supervision, 2013).

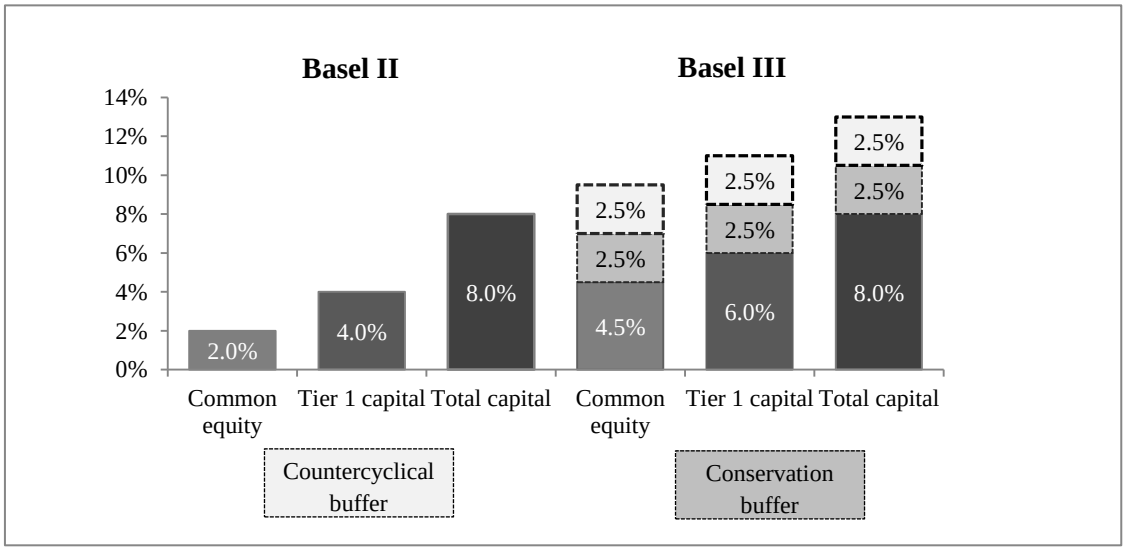
The Basel Capital Accord (Basel I) was originally introduced in 1988. The main focus of the regulations was on capital adequacy, in which the Accord called for a minimum total capital ratio to risk-weighted assets of 8 per cent. The Tier 1 to risk-weighted assets was set to be a minimum of 4 per cent while common equity Tier 1 needed to reach at least 2 per cent. A proposal of the Revised Capital Framework (Basel II) was initially published in 2004 with the objective to let the capital requirements reflect underlying risks (Basel Committee on Banking Supervision, 2004). Basel II introduced the concept of three Pillars, in which Pillar I stipulated the minimum capital requirements set out to cover credit, market and operational risks. Pillar II states additional requirements set by supervisors to cover risks not required in Pillar I. Pillar 3 aims to improve market disciplinary by requesting banks to disclose information on capital adequacy and risk management (Basel Committee on Banking Supervision, 2013). Although the Basel II Accord first came into effect in Sweden by 2007, Swedish banks had already started to adapt beforehand (Lind, 2005).

THE BASEL III REGULATIONS

After the recent financial crisis in 2008 the Basel Committee found Basel II insufficient to handle risks associated with banking activity and created the Basel III regulations. The primary focuses of Basel III are capital and funding. Higher capital requirements, improved quality of capital as well as new liquidity requirements were set with the objective to make the banking system more stable and resistant to future financial crises (Basel Committee on Banking Supervision, 2011).

Regulations regarding capital have tightened and the rules endorse banks to hold more high quality capital, in relation to its risk-weighted assets. The common equity Tier 1 capital ratio must amount to at least 4.5 per cent and the Tier 1 capital ratio must be at least 6 per cent of risk-weighted assets, when Basel III is fully implemented. The total capital ratio is set to 8 per cent, which includes Tier 1 and Tier 2 capital. In addition to these minimum ratios, the banks must hold a 2.5 per cent capital conservation buffer, which makes common equity Tier 1 ratio amount to 7 per cent, Tier 1 ratio amount to 8.5 per cent and total capital ratio amount to 10.5 per cent. Moreover, national authorities will decide on an appropriate level of countercyclical capital buffers. These will range from zero to 2.5 per cent of risk-weighted assets, depending on assessments of the system-wide risks banks undertake in periods of too aggressive credit growth. Figure I below illustrates the changes between the Basel II and Basel III capital requirements (Sveriges Riksbank, 2010a and BIS, 2010).

Figure 1 – Capital requirements under the Basel II and Basel III Accords (fully implemented)



Source: Anders Kvist, 2010, ”Basel III och påverkan på banksektorn”, SEB

Banks must also hold at least 3 per cent of Tier 1 capital to total assets under Basel III. These capital requirements should be implemented gradually until the final implementation date in 2015. The implementation date for liquidity buffers is set to be in 2019 and the leverage ratio of Tier 1 to total assets is to be implemented in 2018. Still, the banks must make their leverage ratios public by 2015.

With regards to funding, the Basel III framework presents two sets of measurements. The Liquidity Coverage Ratio (LCR) focuses on the short-term funding and liquidity. It states that a bank's liquidity buffer must be equivalent to at least the net outflow of cash during a 30-day stress scenario. Banks should comply with the rules set for the LCR by 2015. The requirement for Net Stable Funding Ratio (NSFR) is that the access to stable funding should exceed their need of stable funding. Even though the final implementation date is set to be in 2018, details regarding the measurement are still not set (Sveriges Riksbank, 2010a).

The applicable capital requirements for the Swedish banks in our chosen time period are mainly based on the Basel II rules. The Basel III regulations have only been officially binding since the beginning of 2013, which only account for two quarters in our data. However, the Swedish banks have been aware of a change in regulations ever since 2010 at the latest, in which the Basel III rules were publically announced in the Financially Stability Report of the Central Bank of Sweden (the Riksbank) (Sveriges Riksbank, 2010a). As Swedish banks started to adapt to changes in regulations before the Basel II Accord was officially introduced, they are likely to have done the same with the Basel III regulations.

CAPITAL STRUCTURE AND FUNDING COSTS IN BANKS

The most fundamental approach to the effects of capital structure on firms' operations and costs is the one presented by Modigliani and Miller (1958). The theorem by Modigliani and Miller (M-M) states that under idealised conditions, such as no taxes, fixed cash flows, perfect information symmetry and rational pricing based on risk, the capital structure should have no impact on the overall cost of capital. Although equity is known to be riskier and more expensive than debt, the riskiness of the equity will depend on the amount of debt obtained in relation to the amount of equity. A rational shareholder will require compensation for the increased risk of holding more debt by demanding higher returns on equity. This results in unchanged overall cost of capital. Thus, in case of heightened capital requirements, equity holders will understand that the Basel III Accord makes banks safer. The funding costs of the bank should therefore not become higher. However, in reality there are deviations from

the ideal conditions stated by M-M, which implies that there might be benefits of leverage for banks (Juks, 2010).

One reason why debt lowers the cost of capital for a bank is that debt financing is tax-subsidised. The bank can use pre-tax profits to pay their interest expenses, which is not possible with dividend payments, as these are not tax-deductible. By replacing debt with equity, the tax-shield will be reduced (Juks, 2010).

As opposed to other firms, banks are protected from default by governments and authorities, which are increasingly issuing different kinds of state guarantees to help prevent a bank from failing on the debt obligations in times of recessions (Sveriges Riksbank, 2011a). The guarantees provided by the governments make the debt less risky and consequently cheaper for the bank in relation to the increased operational risk that the debt implies on its own. Banks can therefore use financing that is more risky without being penalised by their creditors, which also enables them to hold lower capital ratios. Thus, the benefits of subsidised guarantees will be lower for a bank with a higher capital ratio, which could make the overall cost of capital more expensive after heightened capital requirements (Juks, 2010).

Another theory that has effect on the choice between equity and debt is the pecking order hypothesis, which was posited by Myers and Majluf (1984). It states that information asymmetry between the market and the management creates a preference ranking among financing choices. According to this theory, managers will prefer funding from internally generated funds, followed by debt and lastly by equity to minimise the costs of adverse selection. The reason is that less informed investors would believe that more informed managers would only choose to issue equity when the market overvalues it. According to Ross (1977), banks in particular are more informed than the market about their own earning prospects as they have accumulated private information about their loan customers. Therefore, banks have incentives to signal internal information through the amount of debt they take on. As demonstrated by Ross (1977), a manager with lower expected cash flows will find it more costly to add debt, as the risk of bankruptcy increases, than a manager who expects high cash flows. The implication is that in order to increase capital ratios, a bank is more likely to reduce the asset side and the levels of debt, rather than raising new equity. It can therefore take time to adjust the capital structure of a bank (Francis and Osborne, 2009).

Cohen (2013) presents a set of strategies that a bank can use in order to increase its risk-weighted capital ratios. First, the bank can boost its profitability either by directly increasing the spread between the interest rates it charges for its loans and the rates they pay for funding. Increasing interest rates will be somewhat limited by competitive pressure from other banks.

Second, the bank can issue new equity or increase the use of retained earnings. An equity issue can be done through existing shareholders, a public market offering or by placing a block of shares with one external investor. As discussed earlier, this option may not seem that attractive due to the frictions of asymmetric information that may lower the share price (Ross, 1977). As noted in MAG (2010a, 2010b), banks can boost capital ratios with the use of retained earnings, either through reduced dividend payments, increased operating efficiency or increased margins on non-interest income. Third, the bank can adjust its asset side of the balance sheet. This can be done by pulling back on its loan portfolio or selling assets and use the proceeds to pay down debt. A bank can also shift the composition of portfolios towards less risky assets by replacing assets of high risk-weights with safer ones that have lower weights, such as government bonds (MAG, 2010a, 2010b). Another option is to use a combined approach of above stated strategies. A bank can for example reduce its loan growth and allow retained earnings to catch up with risk-weighted assets (MAG, 2010a, 2010b).

THE SWEDISH BANKING SYSTEM

The Basel III Accords allows for each nation to define their own capital requirements based on domestic conditions. The Ministry of Finance, the Riksbank and the Swedish Financial Supervisory Authority consider the capital requirements set by the Basel III rules to be insufficient for the four main Swedish banks; Nordea, Swedbank, Handelsbanken and SEB (Sveriges Riksbank, 2011b). There are several reasons for this, as follows.

First, the risks associated with the Swedish banking system are assessed to be significant. Swedish banks have a large dependency on short-term funding. Reliance on short term funding makes banks' liquidity risks larger, which makes the banking system more instable (Sveriges Riksbank, 2011a). The main four Swedish banks also rely on foreign funding to a great extent, which makes them vulnerable to macroeconomic events abroad. Further, the Swedish banking system is highly concentrated. The four main Swedish banks dominate the market and with a combined market share of nearly 75 per cent on both the markets for loans and for deposits (Sveriges Riksbank, 2013b). These four banks are highly interconnected through loans, which make their risks less diversified. The implication is that if one of the banks would face financial difficulties, it is likely to spread and affect the rest of the Swedish banking system. Another implication is that the competitive environment of the banks could impact the interest rates they charge their customers. As the four main banks in Sweden have substantial market power, the interest rates they offer might not be priced competitively

(Sjöblom, 2013). In addition, the use of government guarantees to aid Swedish banks in the recent crisis has created a system in which the market expects and relies on public rescue actions to assist the banking system in times of crisis in the future as well. Thus, the banks have been able to take on higher risks without having to pay for it, as it is transferred to the government instead (Sveriges Riksbank, 2011a).

Second, the negative economic effects of a potential financial crisis in Sweden are assessed to be severe. The main four Swedish banks are relatively large in relation to the size of the Swedish economy, which makes the consequences of a potential financial crisis more severe than for countries where the banking system is smaller in relation to GDP. Further, Swedish banks have steadily expanded operations abroad. On one hand, a global interconnection does spread risks as market exposure is diversified. However, it also hampers efficient crisis management in times of bank distress, as more authorities with different legal frameworks need to be involved. An example of the consequences associated with increased operations abroad is the crisis in the Baltic countries in 2009. Although the financial crisis did not affect the Swedish economy to the same degree as other countries, it did affect Swedish banks as they had large exposures to the Baltic region. At the time of the events, Swedbank and SEB had 16 and 13 per cent respectively of total loans outstanding in the Baltic region, which made them face high credit losses (Sveriges Riksbank, 2010b, DN Debatt 2013).

The Swedish banking system is associated with great risks and the negative effects of a potential crisis are estimated to have substantial impact on the overall Swedish economy (Sveriges Riksbank, 2011a). Given these characteristics of the Swedish banking system, regulators have concluded that the common equity Tier 1 capital ratios for Handelsbanken, Nordea, SEB and Swedbank should be above the Basel III regulations and reach 10 per cent (Sveriges Riksbank, 2011b). In addition to official requirements, banks stipulate internal capital ratios. Apart from shareholders who benefit from a highly levered position in order to maximise returns on equity, creditors and society as a whole will want to ensure adequate capital in order to cover up for potential losses. Thus, the internal capital target set minimum requirements on the size of the capital buffer based on how much risk the bank assumes (Nordea, 2008, Swedbank). Swedish banks often disclose higher internal capital targets than the Basel regulations mandate (see that the variable *Internal Target Surplus* in descriptive data in Appendix is below regulatory capital surplus ratios). The reason is that in addition to the official targets that a bank needs to oblige under the Basel III regulations, individual targets are set by the Swedish Financial Stability Agency for each of the main banks (Johanna

Eklund and David Forsman, personal communication, 2013-11-29). As these targets are not public it is difficult to estimate how well Swedish banks comply.

PREVIOUS LITTERATURE

THE EFFECTS OF CAPITAL STRUCTURE ON LOAN RATES

One argument against heightened capital requirements is that the banks' marginal cost of lending would rise and thus force them to charge higher loan rates (Elliot, 2009). The conclusions reached in prior studies vary, but the majority finds a positive relationship between capital structure and loan rates. However, these negative implications for customers are assessed to be small. The loan rate of interest also differs. Some researches focus on the effect of capital structure on loan yields (interest income over loans), some on lending spreads (loan yield minus deposit rate) and some on net interest margins (net interest income over earning assets).

Alfredo, Ruano and Salas-Fumás (2013) performed a recent study on the impact of equity capital on loan yields by investigating Spanish banks from 1992 to 2007. They conducted an econometric analysis and found that both target equity capital and pure equity ratios were positively correlated with loan yields. The estimated coefficients were 5.7 and 7 basis points respectively.

Elliot (2009, 2010) focused on loan yields and used a pricing formula in order to estimate how the US banking system would be affected by heightened capital requirements. He explained that a bank prices loans based on the costs of funds, any expected credit losses and administrative expenses. He concluded that the loan yield would increase but that these effects would be modest due to the following three reasons. First, the common equity constitutes a relatively small share of the banks' total funding cost. Second, as the overall risk will decrease with lower leverage, the investors' required rate of return will also decrease. Third, banks have several means to restore returns on equity to attractive levels for investors. Thus, banks should be able to raise sufficient capital over time. Gambacorta (2004) performed a study on Italian banks and focused on how monetary tightening impact the loan yields. He found that well-capitalised banks changed their prices less for short-term lending than banks with poor capital levels.

A large quantity of previous studies focus on the effects of capital structure on lending spreads. Researchers that found strong evidence for increased lending spread are for example Slovik and Cournede (2011). They investigated the US, Euro area and Japan and concluded

that in order to meet capital requirements effective in 2015, lending spreads would on average have to increase with 15 basis points. Similarly Cosimano and Hakura (2011) performed a cross-country analysis and concluded that banks on average would have to increase lending spread by 16 basis points due to the Basel III regulations.

MAG (2010b) also assessed that lending spreads would have to increase as it performed a study on MAG members of advance economies in 2010 and analysed how a one per cent increase in target capital ratio would impact lending rates. They concluded that lending spreads would increase between 12.2 and 15.5 basis points. Angelini et al. (2011) performed a similar study and reached the same conclusion. Schanz (2010) tried to estimate the long-run social benefits and costs of heightened capital requirements in the UK and concluded that the real effects of heightened capital requirements on lending spreads would be minor. Additionally, Roger and Vlček (2011) performed a study on European banks and looked at various ways for banks to adjust to heightened capital requirements. They find that if banks choose to adapt to regulations by increasing retained earnings, the lending spread would need to increase by 120 basis points in order to fulfil the capital requirements.

Kashyap, Stein and Hanson (2010) investigated several estimates of loan rates and used two methods to investigate the implications for US banks. The first method was to empirically test how the capital structure affected a various set of mark-ups, such as lending spread and net interest margin, from 1920 to 2009. The results were insignificant and the authors could not conclude whether capital structure affected loan rates or not. A second method was to calibrate how large the incremental effect of an increase in the required ratio of equity to assets was on the weighted average cost of capital (WACC) of a bank. From this approach they concluded that the long-run impact of higher capital requirements on cost of capital was likely to be modest. More precisely they found that loan rates would increase with 25-45 basis points as a result of a ten per cent increase in capital requirements.

Another set of research focus only on net interest margins. Ho and Saunders (1981) conducted an early empirical study one the subject of what determines the net interest margin of a bank. The authors performed their study on US banks and concluded that the margin depended on several factors of which bank characteristics, such as the level of capital, was one. Later research has extended the original model by Ho and Saunders (1981) by including more factors that could explain the net interest margin of banks. Allen (1988) for example included different types of credits and deposits in her study. McShane and Sharpe (1985) and Angbanzo (1997) also extended the original regression model by including several sources of risk, such as uncertainty of money markets and credit risk, in their studies. However, they all

found that capital ratios were positively and significantly correlated with net interest margins. Saunders and Schumacher (2000) performed their study on data from US banks and six selected European countries from 1988 to 1995 and concluded that capital ratios was positively correlated with net interest margin. The authors observed that there was less monopoly power in a more segmented banking system, which meant that the impact on the net interest margins was higher.

THE EFFECT OF CAPITAL STRUCTURE ON LOAN SUPPLY

The effect of capital structure on loan supply is a highly explored topic and previous studies have applied different methods to explore the relationship. Even if previous methodologies differ, they all reached the conclusion that bank capital ratios are positively correlated with loan growth. Correspondingly, a shortage of capital due to stricter capital requirements would reduce loan supply.

MAG (2010b) reached the conclusion that a one per cent increase in target capital ratio would, in addition to assessed increased lending spreads, reduce loan volumes by 1.38 and 1.47 per cent. The study performed by Elliot (2009, 2010) also found that loan volumes in the US would have to decrease as a result of higher capital ratios, but that the effects would be moderate.

One problem that arises when identifying the effect of capital structure on loan growth has been to prove causality and not merely correlation. For example, in times of recessions, capital is generally reduced as loan losses increases. However, recessions are also accompanied with decreased demand. Combining these two effects, it might therefore seem like a shortage of capital reduces bank lending, while it is possible that the two phenomena are only correlated (Kashyap, Stein and Hanson, 2010).

Peek and Rosenberg (1997) controlled for demand by investigating how the loan supply of Japanese US branches was affected by a decline in Japanese stock price between 1989 and 1992. They concluded that risk-based capital requirements related to the Japanese capital market had a positive and economically significant impact on the growth in loans in US branches. Houston, James, and Marcus (1997) performed another study, in which they used another method to control for demand. They examined the topic by investigating the cash-flow sensitivity of loan growth at bank holding companies in the US and the use of an internal capital market to allocate funds to various subsidiaries. They concluded that loan

growth for well-capitalised subsidiary banks was lower when the capital ratio was below regulatory minimum at the bank holding level.

The size of banks also seems to have impact on loan growth. Bernanke and Lown (1991) performed a study on New Jersey banks and investigated the existence of a capital crunch during the recession in the second quarter of 1990 until the first quarter of 1991. One of their main findings was that a shortage of capital reduced bank lending for small banks, while this relationship did not hold for large banks. If larger banks are assumed to have better access to capital markets compared to small banks, their findings provide evidence that supports the capital crunch theory. Bernanke and Lown (1991) also found that banks that came out of the crisis with relatively low levels of capital were more likely to pursue adjustment strategies, which involved slow asset growth. Hancock and Wilcox (1998) concluded, in line with the findings of Bernanke and Lown (1991), that smaller banks in the US were more affected by the capital crunch around 1990.

Hancock and Wilcox (1993, 1994) performed another type of study and investigated the relationship between banks' target leverage ratio and its effect on loan supply. They argue that banks adjust their lending more if the discrepancy is large. Berrospide and Edge (2010) performed a similar study on large BHCs in the US between 1994 and 2008 and concluded that banks with high target capital surplus had higher loan growth the next quarter compared to banks with low levels of surplus. Francis and Osborne (2009) also studied the effects of capital targets on loan growth in the UK between 1996 and 2007 and reached the same conclusion.

The quality of capital also seems to affect the degree to which banks adjust to regulatory capital changes. Brinkmann and Horvitz (1995) found evidence that the asset portfolios of Japanese international banks were highly sensitive to common equity Tier I capital requirements. International banks with low common equity Tier 1 capital ratios reduced their levels of risk-weighted assets heavily by pulling back loans and by substituting it with low-risk assets such as government bonds.

Finally, Ediz, Michael and Perraudin (1998) highlighted that capital requirements had more impact on the behaviour of banks in the UK than the targets that each bank had generated internally. In addition, they found that banks seemed to adjust capital ratios mainly by boosting their capital, and not by substituting away riskier assets as suggested by Brinkmann and Horvitz (1995).

DATA AND METHOLDOLGY

RESEARCH QUESTIONS

Our thesis aims to answer two specific questions. First, *what is the effect of capital structure on loan yield and the net interest margin*? Secondly, *what is the effect of capital surplus on loan supply?* The objective is to investigate whether banks adapt their levels of loan rates and loan supply in accordance with changes in capital structure. We therefore explore these questions from a supply perspective.

SAMPLE

Our sample consists of data from the four main banks in Sweden; Nordea, Swedbank, Handelsbanken, and SEB. We use data on a quarterly basis during a twelve-year time period ranging from 2002 to 2013. We collect the data for macro indicators such as unemployment rate, the repo rate, the yield on 3-month T-Bill and the yield on 10-year Swedish government bonds from the webpage of the Riksbank. Information regarding changes in GDP rates in Sweden is gathered from Statistics Sweden (SCB, Statistiska Centralbyrån). We compile most of the bank-specific data for both dependent and independent variables, such as the capital ratios, the net interest income and the total loans, from a database provided by the Riksbank. We collect data on loan yield and bank-specific control variables such as net charge-offs and market capitalisation from S&P Capital IQ.

METHOD

In order to test whether bank capital structure affect loan rates and loan supply we run several bank fixed effect regressions. We use bank fixed effect regressions to obtain unbiased estimates as we control for unobserved factors that differ across banks but not across time. These factors might for example be corporate cultural, governance policy and business practices. We also include time dummies to control for omitted time varying effects that differ across time periods but not across banks. These seasonal effects might for example be macroeconomic factors such as regulatory changes and international agreements that we otherwise do not control for in our model. We control for heteroskedacticity in all regressions.

We have also conducted an interview with two employees of the Riksbank, Johanna Eklund and David Forsman, both advisers from the Financial Stability department. The aim was to

verify our findings and to receive first-hand information about the Swedish banking system and the Basel regulations from a regulators' point of view.

VARIABLES

All variables are displayed as either growth rates or fractions in order to minimise the use of statuary variables. The variables we use in the regression for bank capital structure on loan rates are influenced by the variables used in research done by Kashyap, Stein and Hanson (2010). As the data used in their study was aggregated, and not bank specific, we have altered their original regression in three main aspects. First, we use fixed effect regressions instead of OLS regressions. Second, we choose to include time dummies instead of a time trend to control for time varying effects. Third, we exclude the control dummy variable for times of recession as our time dummies already capture this effect.

The variables we include in the fixed effects regression of bank capital structure on loan supply is on the other hand influenced by the variables used in papers by Berrospide and Edge (2010) and Hancock and Wilcox (1993, 1994). Since the data used in their studies include a large sample of different banks, in contrast to four banks in our study, we have altered their original regressions as well. We include quarterly dummies and year dummies and not dummies that represent a specific quarter for each year. We also only include one lag of control variables, in contrast to the study by Berrospide and Edge (2010) who include four lags. These two modifications improve the model by making sure that even though the time period is fairly short, the variation is not reduced too much in the sample. Furthermore, we do not include a control variable for lending standards, as this data was not available for the Swedish banks. Finally, our definitions of capital surplus differ from theirs, as our study investigates how surplus in accordance with the Basel regulations and banks disclosed internal targets affect a bank's loan growth. Detailed definitions of the specific variables used in our regression are discussed below.

DEPENDENT VARIABLES

Loan rate

The dependent variables we use for the effects of bank capital structure on loan rates are:

1) *Loan yield* (gross interest income on loans over gross loans)
2) *Net Interest margin (*net interest income over earning assets)

The *Loan yield* only accounts for interest income while the *Net Interest margin* also accounts for the funding costs of a bank. The first variable is the same variable used in the study performed by Alfredo, Ruano and Salas-Fumás (2013). It is a somewhat simplified version of one of the main dependent variables used by Kashyap, Stein and Hanson (2010). Kashyap, Stein and Hanson (2010) had access to data on interest expense from deposits and were able to investigate how the lending spread (between loan yield and deposit rate) varies with capital structure. As this data was not available for the main Swedish banks we choose to use *Loan yield* as the dependent variable. The second variable is the same variable used by Kashyap, Stein and Hanson (2010).

Loan supply

The dependent variables we use for the effect of bank capital structure on loan supply are:

1) *Yearly Growth in Loans (*growth in loans over the next four quarters)
2) *Quarterly Growth in Loans* (growth in loans over one quarter)

These variables are defined as the growth in loans to the public. The second variable is one of the dependent variables used in the study by Berrospide and Edge (2010). Since we expect banks to adapt their loan supply over more than one quarter, we expect the first variable to be larger in magnitude.

INDEPENDENT VARIABLES

Loan rate

The independent variables we use for the effects of bank capital structure on loan rates are:

1) *Total Capital ratio* (total capital to risk-weighted assets)
2) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets)
3) *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets)
4) *Equity to Assets ratio* (total equity to total assets)

These capital ratio variables are used to illustrate how the Basel capital requirements affect loan rates. One or several of these ratios are also used in studies performed by Kashyap, Stein, and Hanson (2010), Cosimano and Hakura (2011), MAG (2010a, 2010b), Elliott (2009), Slovik and Cournede (2011) and Roger and Vlček (2011). The first three variables are all calculated with risk-weighted assets in contrast to the fourth variable, which encompasses total assets. Thus, we expect the regressions with *Equity to Assets ratio* as the

independent variables to yield different results. As the three first variables also constitute constraints under the Basel regulations, we expect them to have larger effect on loan rates. Further, higher quality capital, such as common equity Tier 1 capital, should be more expensive, in which we expect this capital ratio to have larger economic impact on loan rates compared to the other ones.

Loan supply

The independent variables we use for the effect of bank capital surplus on loan supply are:

1) *Total Capital Surplus* (total capital to risk-weighted assets ratio, minus regulatory requirements)
2) *Tier 1 Capital Surplus* (Tier 1 capital to risk-weighted assets ratio, minus regulatory requirements)
3) *CET1 Capital Surplus* (common equity Tier 1 capital to risk-weighted assets ratio, minus regulatory requirements)
4) *Internal Target Surplus* (disclosed capital ratio minus regulatory requirements)

All variables are based on three measurements of capital ratios; total capital to risk-weighted assets, Tier 1 capital to risk-weighted assets and common equity Tier 1 to risk-weighted assets. Each surplus variable is defined as the given capital ratio of the bank minus the minimum regulatory requirement stated by the Basel Committee. The variable *Total Capital Surplus* is therefore calculated as total capital to risk-weighted assets, minus 8 per cent. The variable *Tier 1 Capital Surplus* is calculated as Tier 1 capital to risk-weighted assets minus 4 per cent. The variable *CET1 Capital Surplus* is calculated as common equity Tier 1 capital to risk-weighted assets, minus 2 per cent. For the year of 2013, the regulatory minimum of 10 per cent is subtracted from all of the capital ratios. This is due to the specific requirements stipulated by Swedish authorities, which state that common equity Tier 1 needs to amount to 10 per cent with effect from January 1st, 2013.

The variable *Internal Target Surplus* is calculated as applicable capital ratio minus each bank's internal target ratio for those years in which this ratio was disclosed. We only had access to internal target ratios from the time period 2008 until 2013, in which the number of observations for this regression will be fairly low. The relevant ratios vary and include both Tier 1 capital to risk-weighted assets and common equity Tier 1 capital to risk-weighted assets.

These estimated capital surplus ratios are based on the capital surplus variables used as independent variables in research done by Berrospide and Edge (2010), Francis and Osborne (2009) and Hancock and Wilcox (1993, 1994).

CONTROL VARIABLES

Loan rate

The control variables we use for assessing the effects of bank capital structure on the loan rates are the 3-month *T-bill yield*, *T-bill yield*^{2} (the square of the 3-month T-bill yield), the *Term spread* (10-year Swedish government bond minus the 3-month T-Bill) and the *Loans to Earning Assets* ratio. These variables constitute other plausible determinations of mark-ups other than bank capital structure. The 3-month *T-bill yield*, the *Term spread* and the *Loans to Earning Assets* are expected to be positive, and the *T-bill yield*^{2} is expected to be negative, all in accordance with Kashyap, Stein and Hanson (2010). In the regression of loan yield, we also choose to include the variable *Interest Expense to Total Deposits*. This variable should be positively correlated with the levels of loan rates, as banks are likely to charge higher interest rates if the underlying costs are higher.

Loan supply

The control variables used for assessing the effect of bank capital structure on loan supply are *Quarterly Growth in Loans* lagged one quarter, *change in Unemployment* lagged one quarter, the *Market Capitalisation to Total Assets* ratio, *change in Repo rate* (Federal Funds Rate) lagged one quarter and the *Net Charge-Offs to Total Assets* ratio. At the macro level, the *change in Unemployment Growth* variable is used to control for loan demand, which is consistent with the study done by Hancock and Wilcox (1993). The sign of this variable is expected to be negative, as poor economic times with high employment rates should lower the demand of loans. The *change in Repo rate* is used to control for changes in monetary policies and is a commonly used variable in previous research too. This should intuitive be negatively correlated with the levels of growth in loans.

At the firm level, the *Market Capitalisation to Total Assets* ratio is used as a proxy for the liquidity of the bank and gives a sense of the ability of the bank to adjust the loan growth by using equity securities. This variable is expected to have a positive correlation with the growth in loans. The *Net Charge-Offs to Total Assets* ratio is used as a proxy for the risk of

the operations of the bank, which intuitively should haul the growth of loans. All these control variables are included in the study performed by Berrospide and Edge (2010).

FINAL REGRESSIONS

The regression of the effects of bank capital ratios on loan yields:

$$1 \quad Loan\ yield_i = \delta_0 + \beta_1 Total\ Capital\ ratio_i + \beta_2 T - bill\ yield_i + \beta_3 T - bill\ yield^2 + \beta_4 Term\ spread + \beta_5 \Delta Loans\ to\ Earning\ Assets_i + \beta_6 Interst\ Expense\ to\ Total\ Deposits_{\ i} + u_i$$

The regression of the effect of bank capital ratios on net interest margin:

$$2 \quad Net\ Interest\ margin_i = \delta_0 + \beta_1 Total\ Capital\ ratio_i + \beta_2 T - bill\ yield_i + \beta_3 T - bill\ yield^2 + \beta_4 Term\ spread + \beta_5 \Delta Loans\ to\ Earning\ Assets_{\ i} + u_i$$

The regression of the effect of *Bank Capital surplus* on *Yearly Growth in Loans*:

$$3 \quad Yearly\ Growth\ in\ loans_i = \delta_0 + \beta_1 Total\ Capital\ surplus_{\ i} + \beta_2 Growth\ in\ Loans\ (1\ lag)_{\ i} + \beta_3 Unemployment\ Growth\ (1\ lag) + \beta_4 Change\ in\ Reporate\ (1\ lag) + \beta_5 Market\ Capitalisation\ to\ Total\ Assets_i + \beta_6 Net\ Charge - offs\ to\ Total\ Assets_i + u_i$$

The regression of the effect of *Bank Capital surplus* on growth in loans:

$$4 \quad Quarterly\ Growth\ in\ loans_i = \delta_0 + \beta_1 Total\ Capital\ surplus_{\ i} + \beta_2 Growth\ in\ Loans\ (1\ lag)_{\ i} + \beta_3 Unemployment\ Growth\ (1\ lag) + \beta_4 Change\ in\ Reporate\ (1\ lag) + \beta_5 Market\ Capitalisation\ to\ Total\ Assets_i + \beta_6 Net\ Charge - offs\ to\ Total\ Assets_i + u_i$$

RESULTS

CAPITAL RATIOS AND LOAN YIELD

The Total Capital ratio, Tier 1 Capital ratio and CET 1 Capital ratio are all positively correlated with the Loan yield the next-coming quarter.

The results from our regressions of the independent variables effect on *Loan yield* are presented in Table 1. The three first regressions (see regressions 1.1-1.3) indicate positive and statistically significant relationships between the dependent and the independent variables. These results suggest that the loan yield will increase as the banks have higher capital ratios.

The coefficient is approximately 0.036, when *Total Capital ratio* is used as the independent variable (see regression 1.1). This indicates that if one of the main four Swedish banks increases the total capital ratio of one percentage point in the beginning of the quarter, the loan yield will increase with 0.036 percentage points during quarter. The coefficient is approximately 0.072 when the independent variable *Tier 1 Capital ratio* is used (see regression 1.2). The coefficient reaches approximately 0.034 with the *CET1 Capital ratio*, (see regression 1.3). These results and the magnitudes are similar to the findings of Alfredo, Ruano and Salas-Fumás (2013) who find a positive relationship between the equity capital ratio and loan yield, with a magnitude of the coefficient of approximately 0.07.

According to the pecking order theory provided by Myers and Majluf (1984), higher quality capital is more costly to raise compared to lower quality capital. Institutions should therefore prefer less costly capital or retained earnings as funding options. The fact that the magnitude of the coefficient *Tier 1 Capital ratio* is larger than the coefficient of the variable *Total Capital ratio* validates the hypothesis of Myers and Majluf (1984). However, the fact that the coefficient of the variable *Tier 1 Capital ratio* is larger than *CET1 Capital ratio* suggests the opposite and contradicts the theory. One argument supporting this finding is that Tier 1 capital constitutes a larger portion of the balance sheet than common equity Tier 1 capital and therefore should have larger economic effect on loan rates even if the marginal cost of common equity Tier 1 capital is higher. Nevertheless, looking at the historical development of capital ratios (see graph 1-4), the levels of common equity Tier 1 capital has continuously increased, and replaced lower quality capital. This means that common equity Tier 1 capital today constitutes a larger fraction of the total capital than before and thus, would probably have greater impact on the overall cost of capital for the banks. The reason for why our results do not validate this hypothesis might be due to an insufficient amount of

observations, as data on common equity Tier 1 capital ratios are only available from the third quarter of 2008.

Even as all of these ratios yield statistically significant results, the significance levels are rather high yielding significant result only at five per cents and ten per cents levels. Further, the economic importance can be questioned as the coefficients are relatively small, which implies that the real impacts of increased loan yield for customers probably would be small.

The fact that the regressions with *Equity to Assets ratio* (see regression 1.4) as the independent variable yield insignificant results is more in line with the findings of Kashyap, Stein and Hanson (2010) as well as the M-M theorem. As mentioned earlier, the M-M theorem claims that the cost of capital is unaffected by capital structure. As the equity to asset ratio does not incorporate the riskiness of the banks' assets, it might not determine the level of loan rates to the same degree as other capital ratios, which are stipulated by the Basel regulations and weigh the assets according to their risks. However, as our dependent variable does not include the spread between the loan yield and deposit rate (due to lack of data on interest expense on deposits) as the variable used in Kashyap, Stein and Hanson (2010) does, our findings are not totally comparable.

In addition, several observations of loan yields are missing, mainly for SEB and Handelsbanken from 2004 to 2008, which might have distorted our results. Another factor that might affect our results is the fact that the methodology used to calculate the risk-weighted assets changed in 2007. In 2007, the Basel II regulations came into effect in Sweden, in which the disclosed risk-weighted assets in our data are calculated in accordance with the new rules. Some of the correlation observed in our regressions on capital ratios effect on loan yield might merely reflect a change in calculation method rather than an underlying change in capital structure.

CAPITAL RATIOS AND NET INTEREST MARGIN

All capital ratios seem to be uncorrelated with the Net Interest margin.

The results from our regressions of the independent variables effect on *Net Interest margin* are presented in Table 2. All regressions yield insignificant results (see regression 2.1-2.4). This suggests that even though banks might transfer some of their increased costs to their customers, as seen in the results from regressions on the loan yield discussed in previous section, they do not benefit themselves from increased margins.

Our results support the finding of Hanson, Kashyap and Stein (2010) whose empirical research does not indicate a significant relationship between capital structure and net interest margins for US banks. Still, our results contradict a vast quantity of research, including Ho and Saunders (1981), Allen (1988), McShane and Sharpe (1985) and Angbanzo (1997) who find a positive relationship. However, the time period of our research is more consistent with the research performed by Kashyap, Stein and Hanson (2010). Their time period reaches from 1920 to 2009 and also incorporates the financial crisis in 2008, which might explain why our results are more in line with their findings.

Another explanation could be that the even though banks do not charge their customers excessively, they can earn money from the same customer from ancillary businesses and thus improve profits. As a customer might have exposure to the bank from several different departments, the overall profits generated from each customer could be higher than what is indicated from merely observing net interest margins (Johanna Eklund and David Forsman, personal communication, 2013-11-29). As our regression model does not control for potential ancillary business, this might influence our results.

Further, even though the competitive landscape for the four main Swedish banks can be considered fierce, it is less so compared to other countries. The Swedish banking system resembles and oligopoly in which the main Swedish banks represents nearly 75 per cent of total loans and deposits on the market. All else equal, this should mean that market efficiency is lower in Sweden and thus, that the impact of capital structure on interest margins might be less obvious. This hypothesis is supported by the findings presented by Saunders and Schumacher (2000), who state that the more restricted the banking systems are, the larger is the monopoly power and the higher are the net interest margins. As Swedish banks face limited competition, they are not forced to price their loans completely competitively (Sjöblom, 2013). A change in funding costs might therefore not translate into an immediate need to increase margins for Swedish banks.

As banks are highly levered institutions, the level of capital will constitute a small portion of the overall funding. Debt and deposits account for the majority. The level of capital should therefore not affect the overall cost of capital to a large extent (Elliot 2009), which our results suggest.

Although the different regressions on loan rates yield inconclusive results, the trend that the coefficient is higher for higher quality capital remains. The coefficient on *CET1 Capital ratio* in this case is 0.019, which is larger than the coefficient received in the regressions with *Tier 1 Capital ratio* and *Total Capital ratio* as independent variables.

CAPITAL SURPLUS AND LOAN SUPPLY

The Total Capital Surplus ratio and Tier 1 Capital Surplus ratio are positively correlated with the Yearly Growth in Loans. Still, the Quarterly Growth in Loans seems to be uncorrelated with bank capital surpluses. This indicates that if banks have capital ratios above regulatory targets, changes in loan supply will not occur instantly during the following quarter, but will take place within one year.

The results from our regressions of bank capital surplus on *Yearly Growth in Loans* over are presented in Table 3. Our regression model resembles the one used by Berrospide and Edge (2010), and suggests a positive and statistically significant relationship between the growth in loans and two of our definitions of capital surplus ratios.

When *Total Capital Surplus* is used as the independent variable, the coefficient is approximately 0.390 (see regression 3.1). This indicates that if one of the main four Swedish banks is one percentage point above minimum requirement stipulated by the Basel regulators, the loan growth will be approximately 0.390 the first quarter the following year. When the independent variable *Tier 1 Capital Surplus* is used the coefficient is approximately 0.583 (see regression 3.2). This suggests that when banks have capital surpluses in relation to the Basel requirements, they allow loans to grow and their asset base to expand.

Our results coincide with the findings of the majority of previous studies who find a positive relationship between bank capital surplus and loan growth (Berrospide and Edge, 2010, Bernanke and Lown, 1991 and Francis and Osborne, 2009). The magnitude of the coefficients in our regressions are larger compared to previous studies which at a first glance would imply that Swedish households and corporations are affected to a larger extent by the Basel regulations. However, the results of our regressions of bank capital surplus on growth in loans the next-coming quarter reveals an insignificant relationship (see Table 4). As our study only yields significant results within a year, the results between our study and former ones who find a significant relationship within merely one quarter are not fully comparable. If prior research had investigated the impact of bank capital surplus on the growth in loans within one year, they might have received larger magnitudes of coefficients.

The reason why our regressions do not yield significant results within one quarter, as the regressions of for example Berrsopide and Edge (2010) do, could be because of one or a combination of the following reasons. First, our time period reaches from before the financial crisis in 2008 until five years after, while their study is based on data from a time period that takes place entirely before the crisis. The years after 2008 are turbulent with external and internal events affecting the Swedish banks, such as the crisis in the Baltic countries, which

may have altered our results. The adjustment period for the Swedish banks might therefore have been lagged in comparison. Second, our study includes only four major banks in Sweden whereas theirs include a much larger sample in the US. The majority of previous research includes a large sample of numerous banks as well as banks of different sizes (Riksbanken). Third, previous findings indicate that smaller banks are more affected by heightened capital requirements than larger banks (Bernanke and Lown, 1991). The four Swedish banks are relatively large in proportion to their market, which might be an explanation as to why it takes time for their loan growth to be affected by capital requirements. Furthermore, previous research shows that more profitable banks are also less affected by heightened capital requirements (Cohen, 2013). The four main Swedish banks have been highly profitable for the past years (Sveriges Riksbank, 2013). Therefore, Swedish banks are less likely to be affected than banks in other countries.

An alternative explanation could be that the Swedish banks do not adjust their loan levels in accordance with current capital requirements, but in accordance with future expectations of capital requirements (Johanna Eklund and David Forsman, personal communication, 2013-11-29). Further, as bank specific targets set by the Swedish Financial Stability Agency are not public, the effects of capital on loan supply might in fact be larger than what is suggested by our results. We might therefore overestimate the levels of capital surpluses in Swedish banks and underestimate the effect bank capital surplus has on growth in loans. With a more precise and probably higher estimate of target ratios, our regressions might have yielded significant results the following quarter. As we use the Basel targets in the model, none of the Swedish banks have capital ratios that are below these requirements (see graphs 17-20). According to our definition of capital surplus, banks do not have incentives to drastically alter the asset base in order to achieve higher capital ratios.

When the independent variables *CET1 Capital Surplus* and *Internal Surplus* are used, the regressions yield insignificant results in all regression (see Table 3 and Table 4). The reason for why the these capital surplus ratios do not seem to have explanatory power on the growth in loams might be due to too few observations in our data. The fact that Internal Capital Surplus yields insignificant results are in line with the findings of Ediz, Michael and Perraudin (1998) who conclude that regulatory capital requirements have more impact on the behaviour of banks in the UK than the internal targets that each bank has set up.

CONTROL VARIABLES

None of the control variables are consistently statistically significant. This might be due to the short time horizon that the sample comprises (Francis and Osborne, 2009). Still, looking at the control variables for assessing the effect of bank capital on loan rates, some variables often yield significant results. The variable *T-bill yield* is positive and statistically significant. The sign is expected as a higher T-bill yield would increase the costs of capital for banks and should be translated into higher loan rates. The *square of T-bill yield* is often negative but statistically insignificant. The variable *Loans to Earning Assets* is only significant in one regression (see regression 2.1) in which the sign is positive. This supports the findings of Kashyap, Stein and Hanson (2010). When *Interest Expense to Total Deposits* is used as a control variable, it is positive and statistically significant in two out of four regressions (see regression 1.2 and 1.4). This suggests that the bank's funding costs are positively correlated with the levels of loan yield, which is expected.

The same phenomenon, that none of the control variables are consistently significant, is also found in the regressions of the impact of capital surplus on *Yearly Growth in Loans*. However, some variables often yield statistically significant results. Two regressions (see regression 3.1-3.2) indicate a negative and statistically significant relationship between the *Net Charge-Offs to Total Assets* and *Yearly Growth in Loans*. This is expected, as larger charge-offs should haul banks' desire to increase their loan levels. These variables also display large magnitudes of the coefficients, in the range of 3600-4000 basis points, which suggests that the economic impact of net charge-offs on growth in loans is vast. However, looking at the descriptive date in Appendix, it is noticeable that ratio is consistently extremely low, which implies that an increase in this ratio of merely one percentage points is highly unlikely. The variable *Market capitalisation to Total Assets* is positive and statistically significant in one of our initial regression (see regression 3.4), which is expected as higher levels of cash should enable banks to increase their loan levels.

The variable *change in Repo Rate* for three of our regressions (see regression 4.1.4.2 and 4.4) indicate a positive and statistically significant relationship, which supports the findings of Francis and Osborne (2009) but contradicts the findings of Berrospide and Edge (2010) who find a negative relationship. Higher repo rate should intuitively increase interest rates and restrict the demand of loans. However, it might be the fact that the impact of capital surplus constitutes an even more important factor in explaining growth in loans than the repo rate. Another plausible explanation presented by Francis and Osborne (2009) is that the results we gain actually reflect the determination of interest rates instead, which in this case

should imply a positive relationship. Furthermore, the choices of research countries by Berrospide and Edge (2010) are determined among different states in the US, which might translate into problems with endogeneity (Francis and Osborne, 2009).

The variable *change in Unemployment rate* is negative and statistically significant in one regression (see regression 3.4), which is expected as bad economic times should discourage households and firms to increase their loans.

The regressions for assessing the impact of bank capital on loan growth the next quarter yield insignificant results among the majority of variables. This might be due to a too short time period observed or that changes in the variables are not apparent within merely a quarter. It could also be due to the fact that the banks and macroeconomic conditions changed substantially as the financial crisis occurred. A true relationship between the variables included in the model might therefore be hard to find. Further, as we control for both bank and time characteristics by the use of a bank fixed effects regression and time dummies, we might already capture the most of the variation, which might yield the insignificant control variables.

ROBUSTNESS CHECKS

WINSORISE DEPENDENT VARIABLES AT A ONE PER CENT LEVEL

In order to validate our results we have chosen to perform two types of robustness tests. The first is to winsorise all dependent variables (both loan rates and growth in loans) at a one per cent level. The results are displayed in Table 5-8. The results largely remain the same, in which the majority of variables that yielded significant results in the original regressions still do. However, the variable *Total Capital ratio* does no longer indicate a significant relationship with *Loan yield*. On the other hand, the variable *Tier 1 capital ratio* now yields positive and statistical results at a one per cent level, an improvement from original regression, which yielded significant results at the five per cent level. This suggest that the *Tier 1 Capital ratio* is better at projecting loan yields than the *Total Capital ratio* is.

CHANGING VARIABLES

The second approach is to change a set of control variables. In the regression of the impact of capital structures on loan rates we have chosen to include variables that controls for the profitability of banks, i.e. *ROE* (Return on Equity) and a proxy for anticipated credit losses,

i.e. *Net Charge-Offs to Total Assets*. We chose to include *ROE* as we argue that a bank has less incentive to increase loan rates if they are profitable, and thus could use retained earnings to increase their capital ratios. The argument for including a control variable for net-charge offs is, as discussed in research performed by Elliot (2009, 2010), anticipated credit losses for a bank determines the loan rates that a bank charge their customers. The results are displayed in Table 9-10. The results largely remain the same except for the fact that the variable *Total Capital ratio* no longer yields significant results in the regression of loan yields. The results reached are the same as when winsorising the data in the first robustness test. This again suggests that the *Tier 1 Capital ratio* is better at explaining the loan yield than the *Total Capital ratio*. Further, *ROE* seems to be highly correlated with the *Net Interest margin*, which is expected since highly profitable banks tend to have high returns. Another observation is that many control variables now loses its significance. This might be a consequence of including too many variables in the regression model.

In the regression of the impact of capital structure of growth in loans we have chosen to also include a variable that controls for the profitability of banks, i.e. ROE. This is done as previous research argue that highly profitable banks has less incentives to change their level of loans as a result of changes in capital structure (Cohen, 2013). We also choose to change one of our control variables for macroeconomic effects. In our first regressions we have used the change in unemployment rate as a proxy for market demand of loans in accordance with the study performed by Hancock and Wilcox (1993, 1994). In order to validate our results we have chosen to replace this variable with the variable *change in GDP rate*, which is a variable used in the study performed by Berrospide and Edge (2010). These regressions are displayed in Table 11-12.

Overall, the conclusion reached of the impact of capitals structure on loan supply remains the same. However, the significance level changes for some control variables, in which some actually increase. Two out of four regressions now yield positive and statistically significant results for the variable *Market Capitalisation to Total Assets*. Further, the control variable *change in GDP rate* also yields positive and statistically significant results, which is expected, as demand should be higher in economically flourishing times.

CONCLUSION

Bank capital structure seems to have a modest impact on loan rates and supply of loans for the main four Swedish banks. Thus we consider heightened capital requirements to be justified.

The findings of our thesis suggest that Swedish banks have adapted loan rates and loan supply in accordance with heightened capital requirements stipulated by the Basel Accord. The effects on loan rates are assed to be small, and the banks only seem to increase their level of loan rates in order to cover up for higher cost of capital. Thus, the implications for the customers of the Swedish banks are considered to be relatively modest. This finding is in line with previous research that finds heightened capital requirements to have a modest effect on the interest rates a bank charges its customers Elliot (2009, 2010)

The results of our thesis also suggest that when capital surplus in relation to Basel regulations increases, the Swedish banks tend to increase loan supply. These effects are though only noticeable within a horizon of one year. Many prior studies find a more immediate impact of capital surplus on loan growth (Berrospide and Edge, 2010). Even if these effects of loan growth seem to be lagged, the economic impact on customers seems to be larger compared to the effects of slightly increased loan rates.

The reason as to why the effects of loan rates are small and the effects on loan supply seem to be delayed compared to previous research seems to be due to the characteristics of the Swedish banking system. The Swedish banking system resembles an oligopoly with a few banks that dominate the market. As the competition is lower compared to other countries, the market is not as efficient in adjusting to changed capital policies. Another reason for the discrepancies with prior studies is due to the time period which our study compromises. Exogenous factors such as the financial crisis in 2008, changes in calculation methods of risk-weighted assets and high credit losses from the Swedish banks' presence in the Baltic region have severally affected their credit policies. Less noticeable results of the effects of capital on loan rates and loan supply is therefore anticipated. Further, in contrast the majority of banks in other countries, the main Swedish banks have historically been well-capitalised. As Swedish banks are not forced to take severe actions to increase their levels of capital in accordance with new capital regulations, the modest effects in Sweden are reasonable.

As there is a lack of transparency of bank specific targets set by the Swedish Financial Stability Agency, the effects of capital on loan rates and loan supply might in fact be larger than what is suggested by our results. Further, as banks might adapt to future expectations of

capital requirements and not to current regulations, our results might overvalue Swedish banks' capital adequacies. Still, as suggested by previous research, banks can adapt to higher capital requirements through a combination of adjustment methods. For example, Swedish banks might have shifted their portfolio of assets towards less risky ones and/or retained more of their earnings in order to not decrease loan volumes or change loan rates significantly.

Another finding is that it seems like capital ratios calculated with risk-weighted assets affect the level of loan rates and loan supply, which a pure leverage ratio including total assets does not. One argument that explains this finding is that banks' capital adequacies are assessed based on their levels of risk-weighted assets, and not on their levels of capital in relation to total assets. As banks face regulations, they are more likely to incorporate these rules into their capital policies. Another explanation is that, in accordance with the M-M theorem, investors want to be compensated for the risk they take on, which capital in relation to risk-weighted assets incorporate to a larger extent.

According to the M-M theorem, a change in capital structure should not affect the overall cost of capital for the bank. As banks increase their level of loans, investors should realise that the banks are safer and demand lower return on equity. The fact that we find evidence that Swedish banks do adjust their levels of loan rates and loan growth, contradicts this hypothesis. This implies that factors such as the tax-shield and government guarantees do affect the costs of capital and that the M-M theorem does not hold in reality.

The main conclusion reached in this thesis is that the potential negative effects of heightened capital requirements do not seem to be severe. As the Basel III regulations will be implemented gradually, we asses that Swedish banks will have sufficient time to successfully adjust. Further, as the Swedish banking system is associated with relatively large risks and as our thesis does not take into consideration the social benefits of increased capital, we conclude that heightened capital requirements are justified.

FURTHER RESEARCH

In our study of how the level of capital and capital surplus affects loan rates and loan supply, the time period is twelve years from 2002 to Q2 2013. The Basel II regulations were replaced by the Basel III regulations in 2013. A first suggestion for further research is to expand this time period, given access to required dataset. Performing a similar study in the future when the Basel III regulations are measureable could capture this. In this case, it would be interesting to see whether a prolonged time period, given the Basel III regulations, would

yield different results and how the Swedish banks adapt thereafter. One example is the implications of significantly increased levels of common equity Tier 1 capital, as our study possibly contain too few observations to shed light on the true impact it has on loan rates and loan supply.

Furthermore, in order to fully comprehend the implications of Basel III, a second suggestion is to investigate the effects of other regulatory requirements stated in the regulations. The liquidity requirements are newly established, and could therefore be thoroughly investigated in a few years from now. These requirements are especially interesting for Swedish banks because they are highly dependent on short term funding and currently do not fully comply with the liquidity requirements.

Additionally, a study with more in-depth focus on *how* Swedish banks adapt to higher capital requirements would contribute to the understanding of the subject. The results of our thesis would be explained further by understanding if banks adjusted their capital by reducing their level of risk-weighted assets or by increasing levels of capital through some of the methods stated earlier in this report. The means to reach the required capital ratio probably has the most effect on various stakeholders of the banks.

Our thesis did not have access to internal targets for all banks at all time periods. Several assumptions were therefore made. Access to either a full dataset of internal targets or to bank specific targets set by the Swedish Financial Stability Agency would highly substantiate the conclusion reached in this thesis.

Finally, an observation on weather capital surplus effect on loan supply differs between different types of loans would shed important light on the outcomes of the regulation for the different customer segments. If the effect differs between household loans and corporate loans for example, and an understanding of this would be useful. A hypothesis is that riskier loans are more affected by a shortage in capital than less risky loans. A research of this would therefore be interesting.

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APPENDIX

DATA DESCRIPTION DEFINITIONS - BANK CHARACTERISTICS

Variables	Definition
Total Capital ratio (%)	Total Capital ratio is calculated as total capital to risk-weighted assets.
Tier 1 Capital ratio (%)	Tier 1 Capital ratio is calculated as Tier 1 capital to risk-weighted assets.
CET1 Capital ratio (%)	CET1 Capital ratio is calculated as common equity Tier 1 capital to risk-weighted assets.
Equity to Assets ratio (%)	The Equity to Assets ratio is calculated as total equity divided by total assets.
Total Capital Surplus (%)	Regulatory Surplus Total is calculated as total capital to risk-weighted assets minus regulatory requirement.
Tier 1 Capital Surplus (%)	Regulatory Surplus Tier 1 is calculated as Tier 1 capital to risk-weighted assets minus regulatory requirement.
CET1 Capital Surplus (%)	Regulatory Surplus CET1 is calculated as common equity Tier 1 capital to risk-weighted assets minus regulatory requirement.
Internal Target Surplus (%)	Internal Target Surplus is calculated as the disclosed target capital ratio minus regulatory requirement. The relevant ratios vary and include both Tier 1 to risk-weighted assets ratio and common equity Tier 1 to risk-weighted assets ratios.
Loan yield (%)	Loan yield is calculated as the interest income on loans over gross loans (incoming balance).
Net Interest margin(%)	Net interest income to Earning Assets is calculated as net interest income over all assets that generate interest income (incoming balance).
Yearly Growth in Loans (%)	Yearly Growth in Loans is calculated by dividing total loans one quarter with the total loans four quarters before and subtracting one. This variable is defined as the growth in loans to the public.
Quarterly Growth in Loans (%)	Quarterly Growth in Loans is calculated by dividing total loans one quarter with the total loans the previous quarter and subtracting one. This variable is defined as the growth in loans to the public.
Loans to Earning Assets (%)	Loan to Earning Assets is calculated by dividing total loans with all assets on the balance sheet that yield income.
Interest Expense to Total Deposits (%)	Interest Expense to Total Deposits is calculated as the interest expense over total deposits (incoming balance).
Market Capitalisation to Total Assets (%)	Market Capitalisation to Total Assets is calculated by dividing total market capitalisation by total assets.
Net Charge-Offs to Total Assets (%)	Net Charge-Offs to Total Assets is calculated by dividing net charge-offs by total assets.

DATA DESCRIPTION DEFINITIONS - MACRO CHARACTERISTICS

Variables	Definition
T-bill yield (%)	T-bill yield is calculated as the 3-month Treasury bill yield in Sweden.
(T-bill yield)^2 (%)	(T-bill yield)^2 is calculated as the square of the 3-month Treasury bill yield in Sweden.
Term spread (%)	Term spread is calculated as the 10 year Swedish Government Bond minus the 3-month Treasury Bill.
ΔRepo Rate	ΔRepo Rate represents the change in federal funds rate (repo rate). The variable is calculated by dividing the repo rate one quarter with the repo rate the previous quarter and subtracting one.
ΔUnemployment Rate	ΔUnemployment rate represents the change in unemployment rate. The variable is calculated by dividing the unemployment rate one quarter with the unemployment rate the previous quarter and subtracting one.
ΔGDP Rate	ΔGDP rate represents the change in GDP rate. The variable is calculated by dividing the GDP rate one quarter with the GDP rate the previous quarter and subtracting one.

DESCRIPTIVE DATA

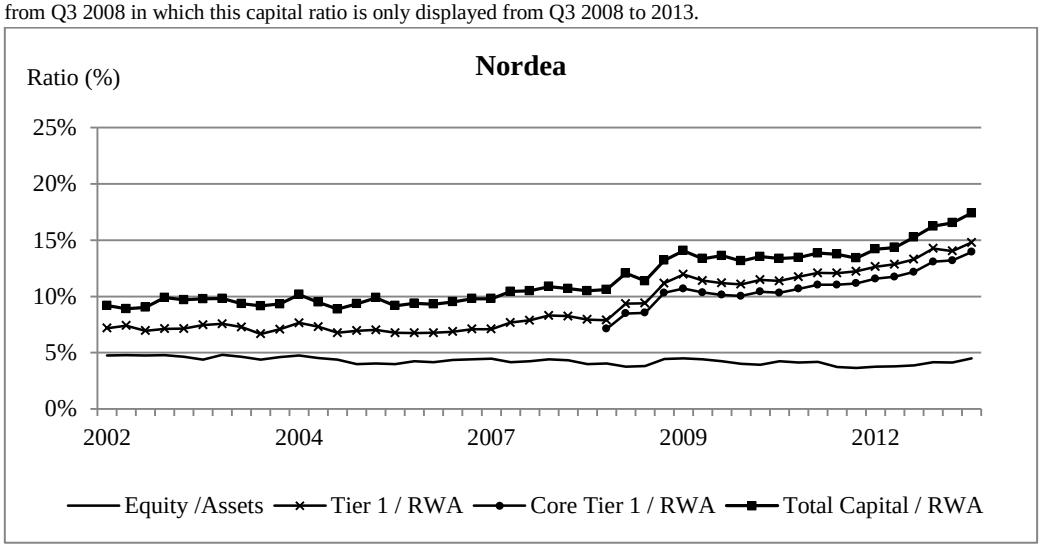
This table shows data description statistics of our sample. Reported are the 1st percentile, mean, median, 99th percentile, standard deviation and number of observations.

Data description						
Variables	p1	Mean	p50	p99	SD	N
Bank characteristics						
Total Capital ratio (%)	0.089	0.133	0.123	0.211	0.036	183
Tier 1 Capital ratio (%)	0.060	0.106	0.087	0.205	0.040	183
CET1 Capital ratio (%)	0.071	0.127	0.122	0.184	0.028	80
Equity to Assets ratio (%)	0.029	0.041	0.042	0.055	0.005	183
Total Capital Surplus (%)	0.008	0.052	0.043	0.130	0.035	183
Tier 1 Capital Surplus (%)	0.020	0.064	0.047	0.165	0.038	183
CET1 Capital Surplus (%)	0.032	0.098	0.097	0.164	0.030	80
Internal Target Surplus (%)	-0.011	0.037	0.032	0.110	0.029	80
Loan yield (%)	0.006	0.012	0.012	0.022	0.004	143
Net Interest margin(%)	0.002	0.003	0.003	0.005	0.001	180
Yearly Growth in Loans (%)	0.904	1.070	1.062	1.253	0.077	172
Quarterly Growth in Loans (%)	-0.074	0.016	0.019	0.076	0.028	184
Loan to Earning Assets (%)	0.495	0.693	0.702	0.873	0.091	175
Interest Expense to Total Deposits (%)	0.004	0.015	0.013	0.037	0.008	143
Market Capitalisation to Total Assets (%)	0.009	0.059	0.058	0.092	0.016	184
Net Charge-Offs to Total Assets (%)	-0.001	-0.000	-0.000	0.000	0.000	160
Macro characteristics						
T-bill yield (%)	0.001	0.022	0.020	0.044	0.013	184
Term spread (%)	-0.002	0.014	0.014	0.032	0.009	184
Repo rate	0.003	0.022	0.020	0.045	0.012	184
Unemployment rate	0.037	0.067	0.070	0.095	0.015	184
Change in GDP rate	-0.013	0.005	0.008	0.015	0.007	184

HISTORICAL DEVELOPMENT OF CAPITAL RATIOS

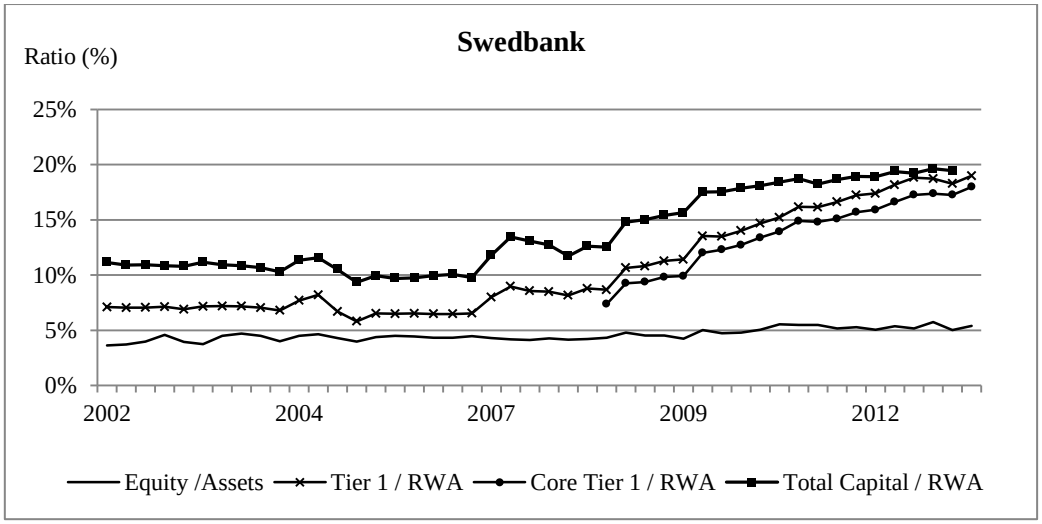
GRAPH 1: CAPITAL RATIOS OF NORDEA

This figure shows the quarterly development of four different definitions of capital ratios for Nordea from year 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio.* From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from Q3 2008 to 2013.



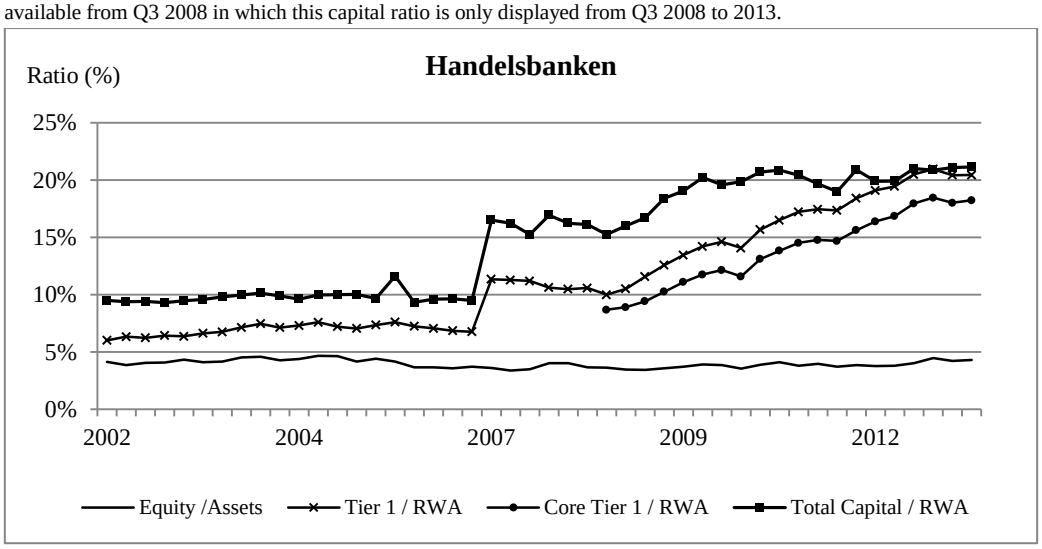
GRAPH 3: CAPITAL RATIOS OF SWEDBANK

This figure shows the quarterly development of four different definitions of capital ratios for Swedbank from year 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio.* From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from Q3 2008 to 2013.



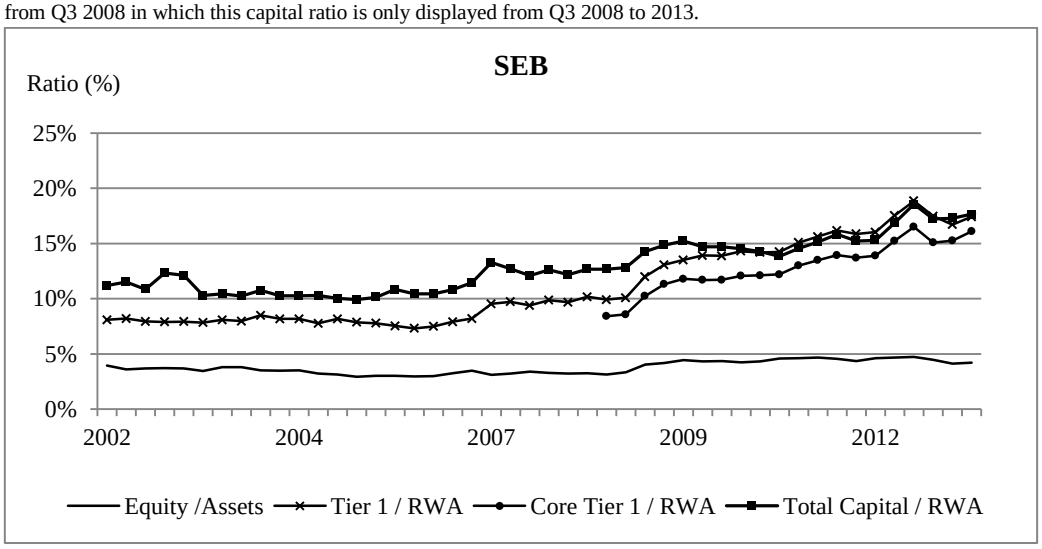
GRAPH 3: CAPITAL RATIOS OF HANDELSBANKEN

This figure shows the quarterly development of four different definitions of capital ratios for Handelsbanken from year 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1capital to risk-weighted assets) and *Equity to Assets ratio.* From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from Q3 2008 to 2013.



GRAPH 4: CAPITAL RATIOS OF SEB

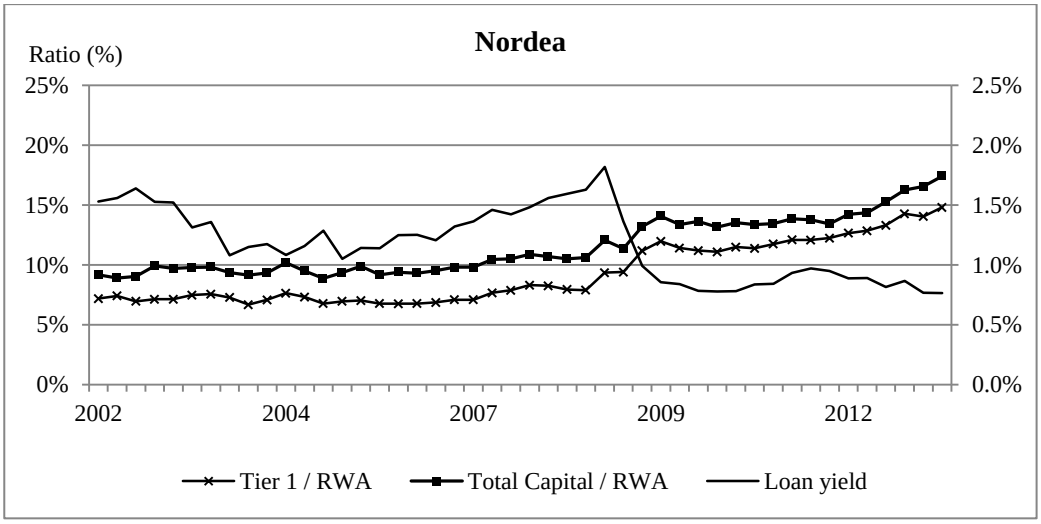
This figure shows the quarterly development of four different definitions of capital ratios for SEB from year 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio.* From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from Q3 2008 to 2013.



HISTORICAL DEVELOPMENT OF LOAN YIELD

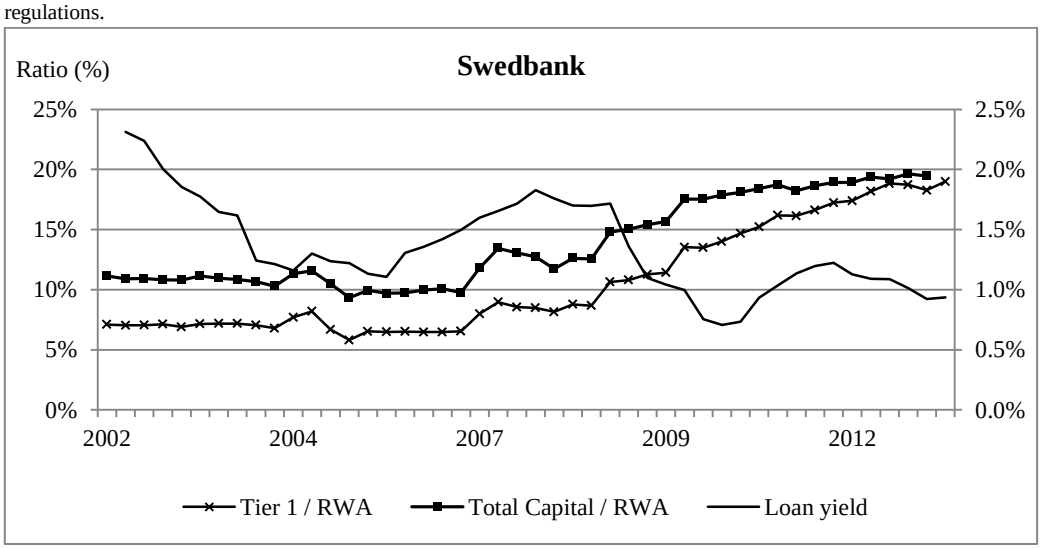
GRAPH 5: CAPITAL RATIOS AND LOAN YIELD OF NORDEA

This figure shows the quarterly development of two different definitions of capital ratios and loan yield for Nordea from the years of 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



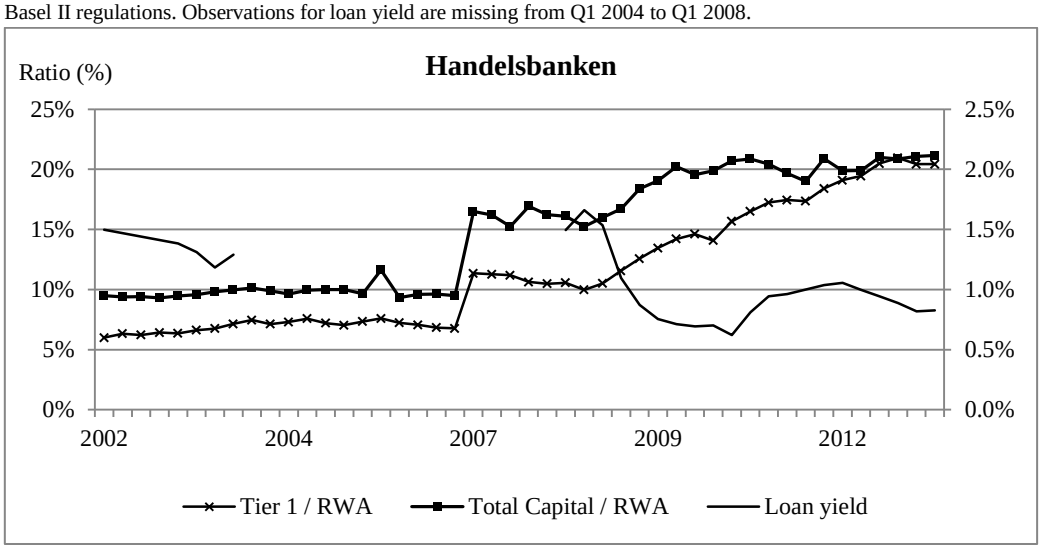
GRAPH 6: CAPITAL RATIOS AND LOAN YIELD OF SEB

This figure shows the quarterly development of two different definitions of capital ratios and loan yield for Swedbank from the years of 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



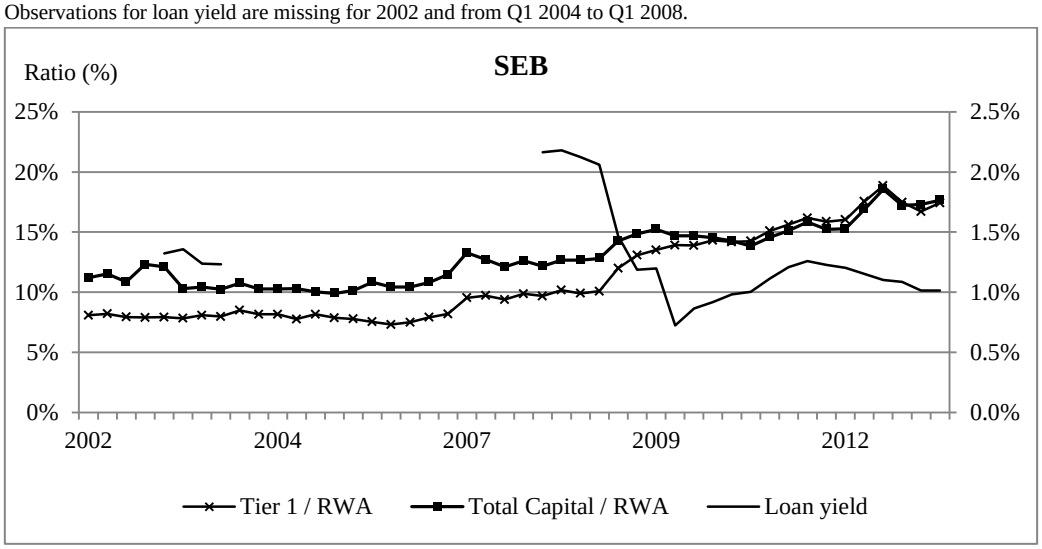
GRAPH 7: CAPITAL RATIOS AND LOAN YIELD OF HANDELSBANKEN

This figure shows the quarterly development of two different definitions of capital ratios and loan yield for Handelsbanken from year 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Observations for loan yield are missing from Q1 2004 to Q1 2008.



GRAPH 8: CAPITAL RATIOS AND LOAN YIELD OF SEB

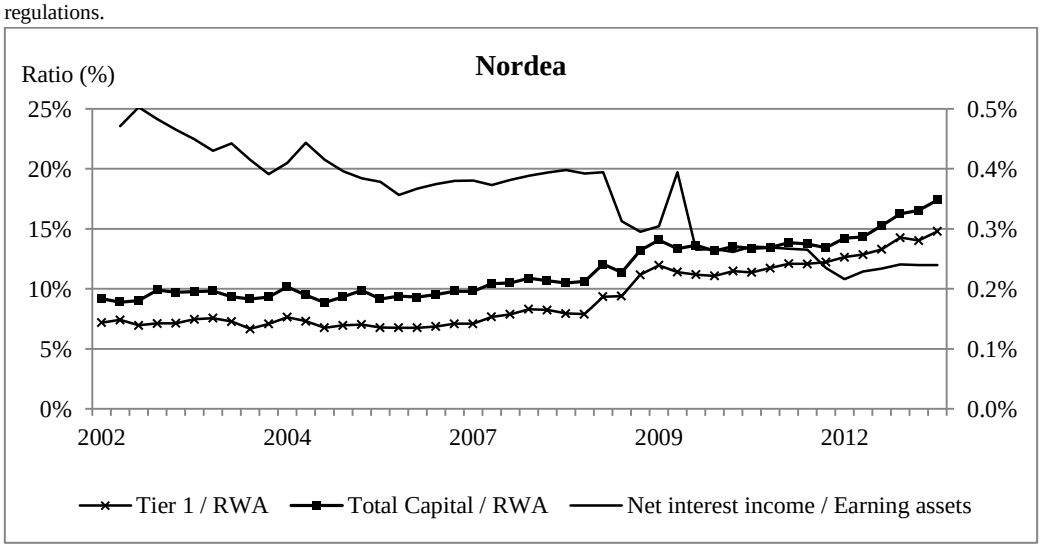
This figure shows the quarterly development of two different definitions of capital ratios and loan yield for SEB from year 2002 until 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Observations for loan yield are missing for 2002 and from Q1 2004 to Q1 2008.



HISTORICAL DEVELOPMENT OF NET INTEREST MARGIN

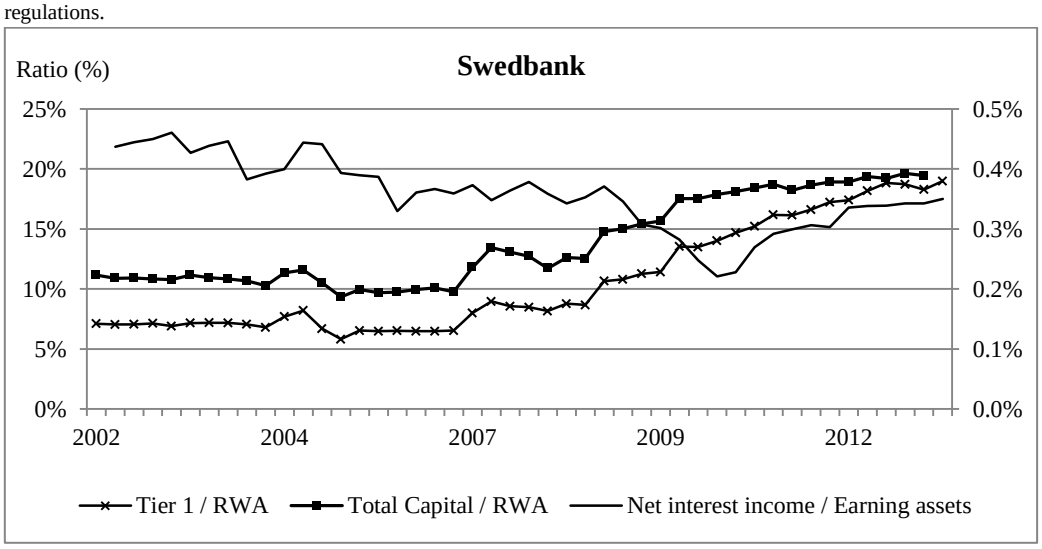
GRAPH 9: CAPITAL AND NET INTEREST MARGIN OF NORDEA

This figure shows the quarterly development of two different definitions of capital ratios and net interest margin for Nordea from year 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



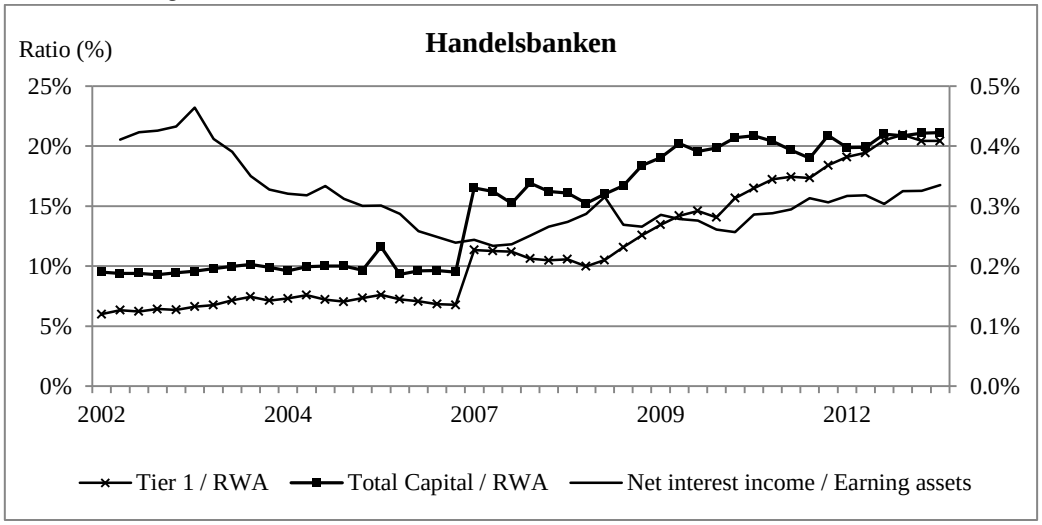
GRAPH 10: CAPITAL AND NET INTEREST MARGIN OF SWEDBANK

This figure shows the quarterly development of two different definitions of capital ratios and net interest margin for Swedbank from year 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



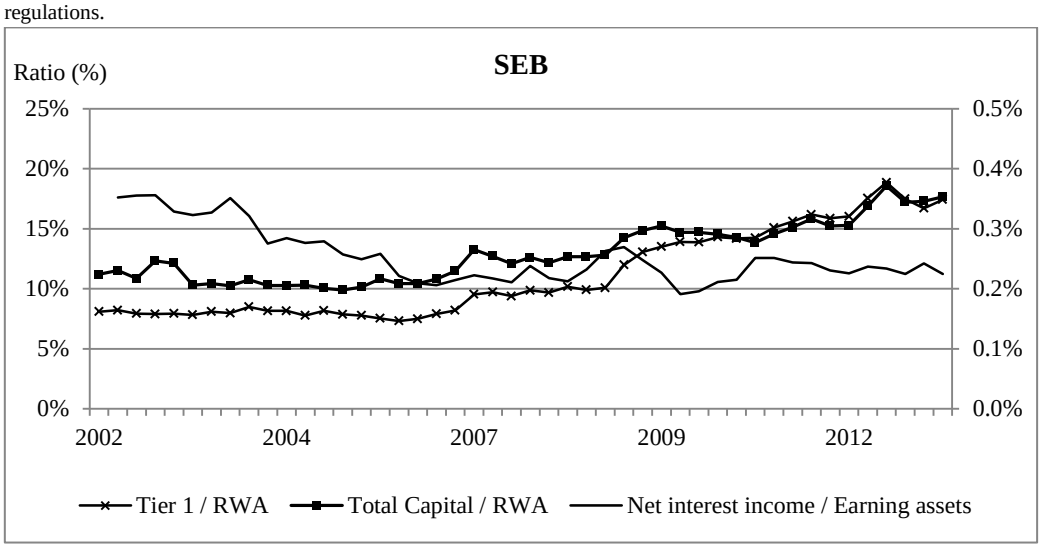
GRAPH 11: CAPITAL AND NET INTEREST MARGIN OF HANDELSBANKEN

This figure shows the quarterly development of two different definitions of capital ratios and net interest margin for Handelsbanken from the years of 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



GRAPH 12: CAPITAL AND NET INTEREST MARGIN OF SEB

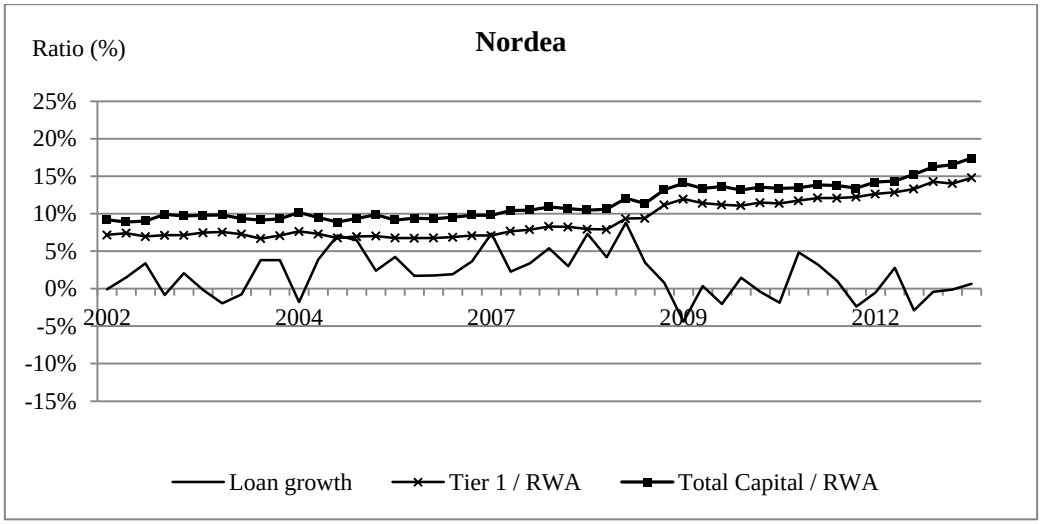
This figure shows the quarterly development of two different definitions of capital ratios and net interest margin for SEB from the years of 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



HISTORICAL DEVELOPMENT OF CAPITAL RATIOS AND LOAN SUPPLY

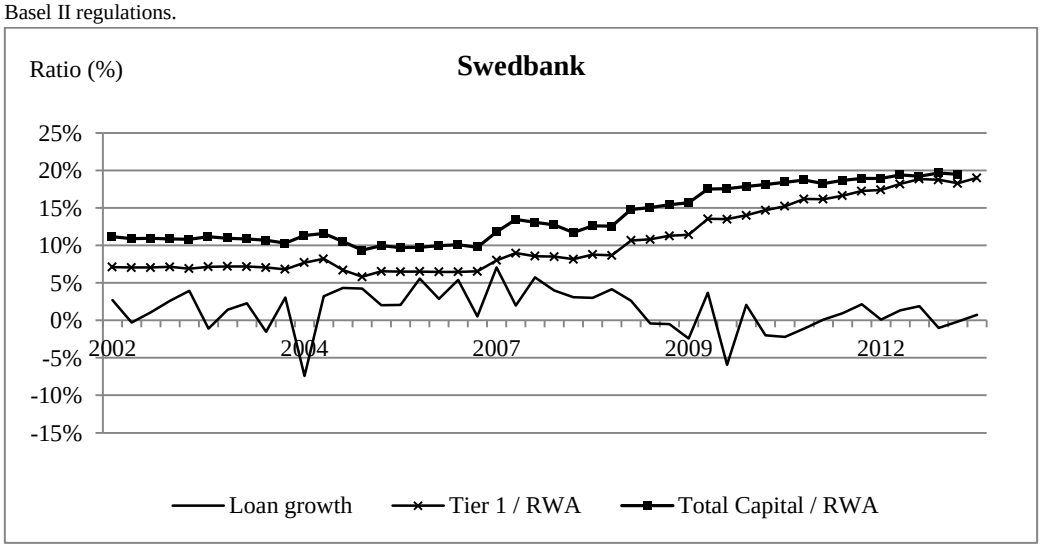
GRAPH 13: CAPITAL AND GROWTH IN LOANS OF NORDEA

This figure shows the quarterly development of two different definitions of capital ratios and growth in loans for Nordea from the years of 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



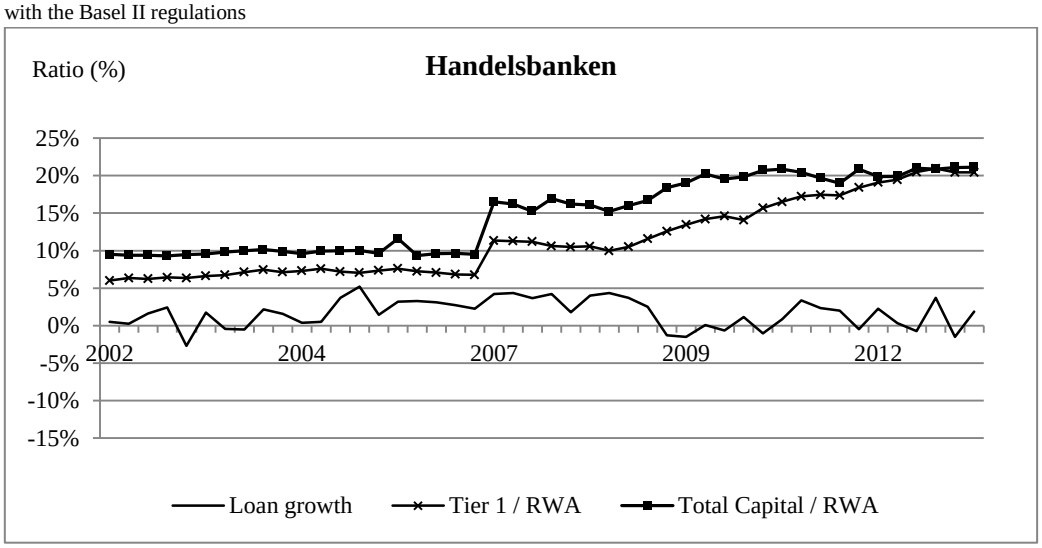
GRAPH 14: CAPITAL AND GROWTH IN LOANS OF SWEDBANK

This figure shows the quarterly development of two different definitions of capital ratios and growth in loans for Swedbank from the years of 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



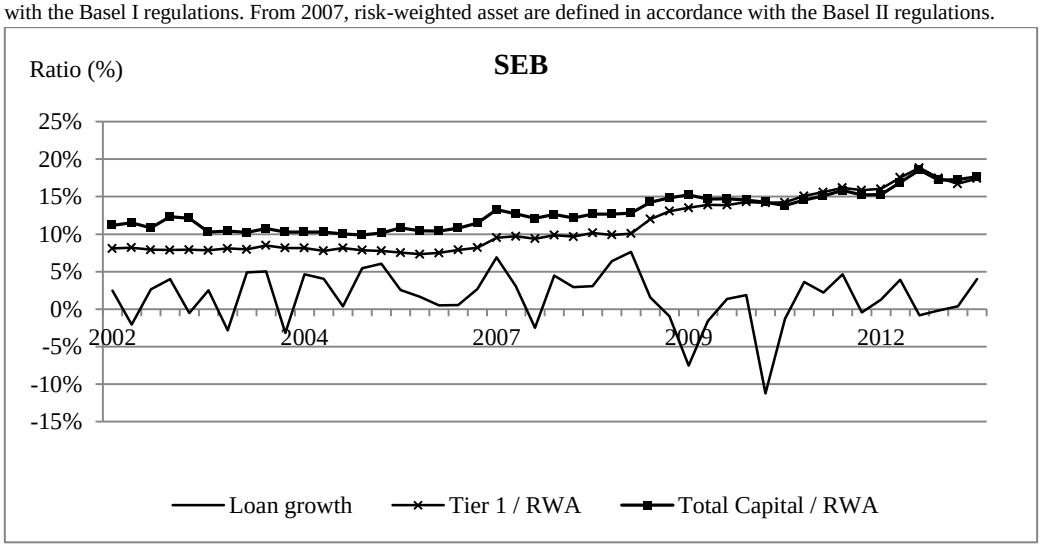
GRAPH 15: CAPITAL AND GROWTH IN LOANS OF HANDELSBANKEN

This figure shows the quarterly development of two different definitions of capital ratios and growth in loans for Handelsbanken from the years of 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations



GRAPH 16: CAPITAL AND GROWTH IN LOANS OF SEB

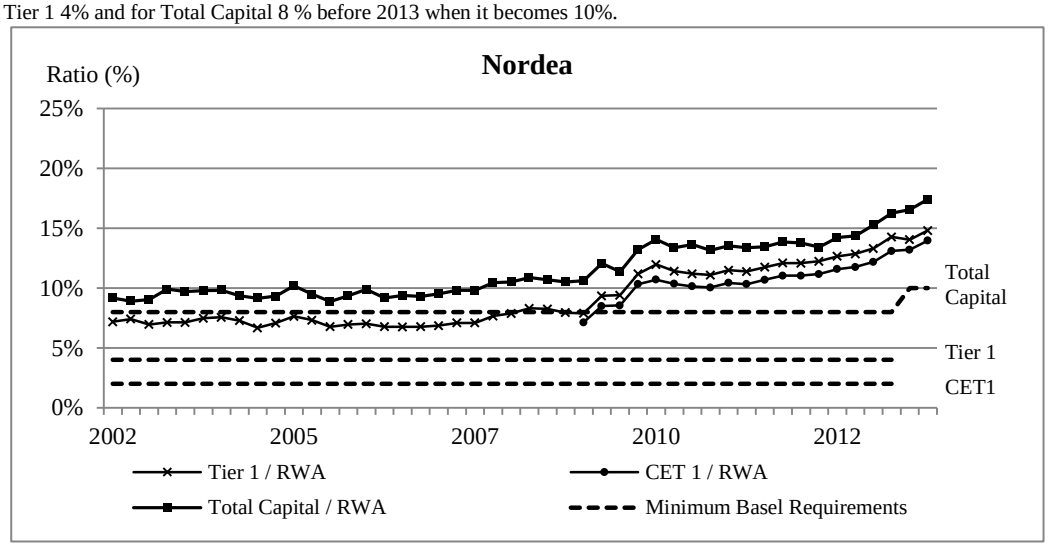
This figure shows the quarterly development of two different definitions of capital ratios and growth in loans for SEB from year 2002 to 2013. The two capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) and *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets). From 2002 to 2006, risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations.



HISTORICAL DEVELOPMENT OF CAPITAL RATIOS IN RELATION TO BASEL MINIMUM REQUIREMENTS

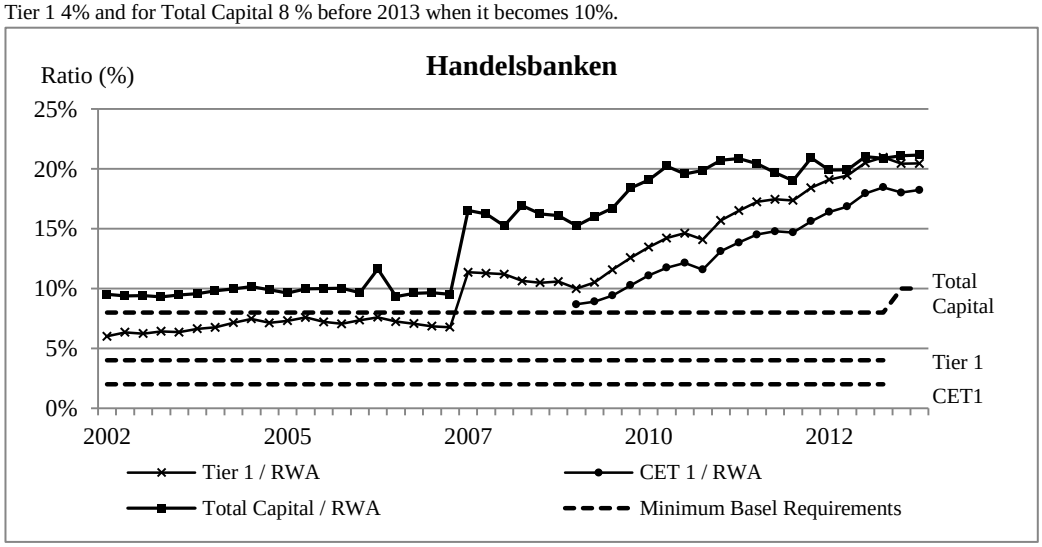
GRAPH 17: CAPITAL RATIOS OF NORDEA

This figure shows the quarterly development of three different definitions of capital ratios for Nordea from the years of 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets) *and CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets). From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from the Q3 2008 to 2013. The regulatory target for CET 1 is 2%, for Tier 1 4% and for Total Capital 8 % before 2013 when it becomes 10%.



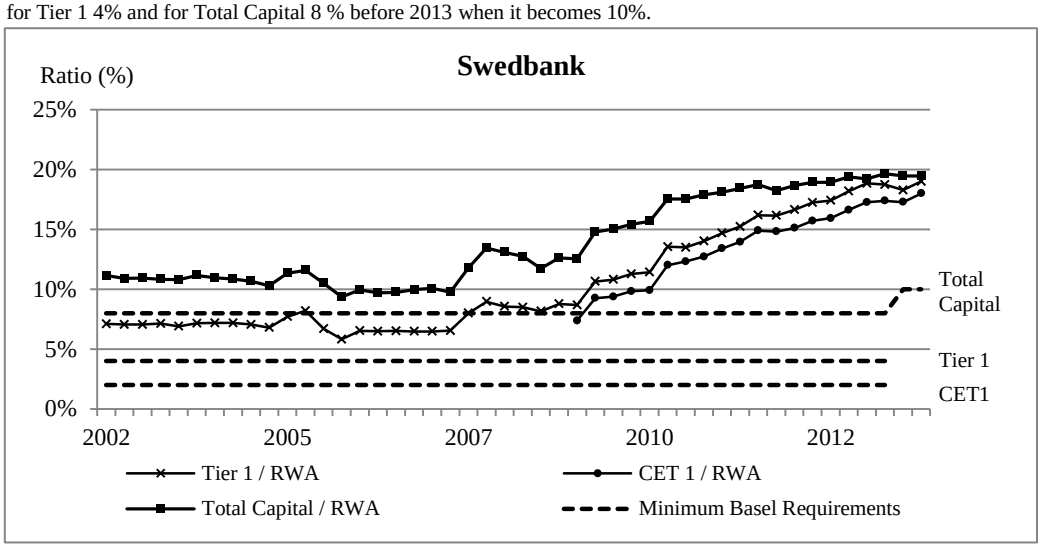
GRAPH 18: CAPITAL RATIOS OF SWEDBANK

This figure shows the quarterly development of four different definitions of capital ratios for Swedbank from the years of 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets) and *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets). From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from the Q3 2008 to 2013. The regulatory target for CET 1 is 2%, for Tier 1 4% and for Total Capital 8 % before 2013 when it becomes 10%.



GRAPH 19: CAPITAL RATIOS OF HANDELSBANKEN

This figure shows the quarterly development of four different definitions of capital ratios for Handelsbanken from the years of 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets) and *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets). From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from the Q3 2008 to 2013. The regulatory target for CET 1 is 2%, for Tier 1 4% and for Total Capital 8 % before 2013 when it becomes 10%.



GRAPH 20: CAPITAL RATIOS OF SEB

This figure shows the quarterly development of four different definitions of capital ratios for SEB from the years of 2002 to 2013. The four capital ratios are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets) and *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets). From 2002 to 2006 the risk-weighted assets are defined in accordance with the Basel I regulations. From 2007, risk-weighted asset are defined in accordance with the Basel II regulations. Data on CET1 capital is only available from Q3 2008 in which this capital ratio is only displayed from the Q3 2008 to 2013. The regulatory target for CET 1 is 2%, for Tier 1 4% and for Total Capital 8 % before 2013 when it becomes 10%

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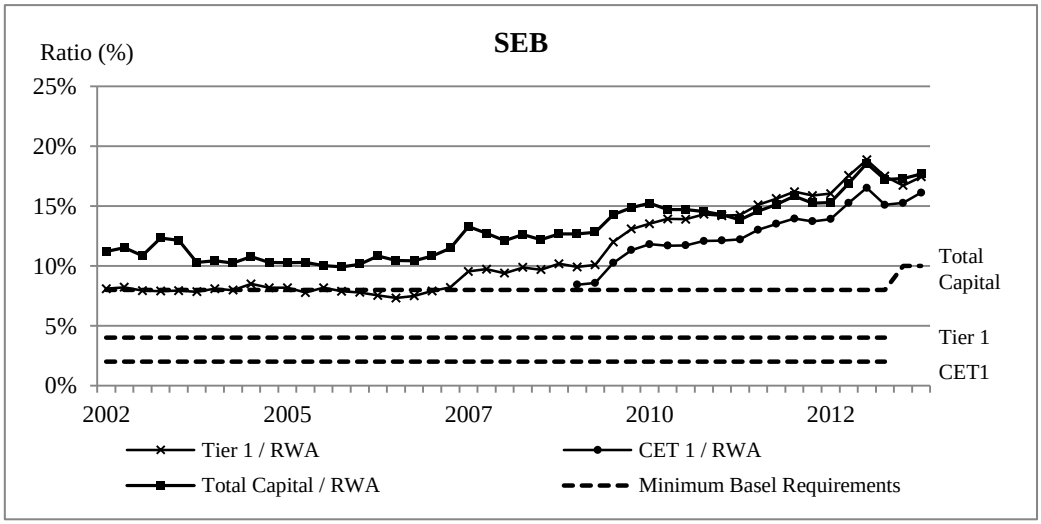

TABLES

TABLE 1: CAPITAL RATIOS AND LOAN YIELD

This table shows fixed effects regressions on the dependent variable *Loan yield*. This variable is calculated as interest income on loans over gross loans. The four independent variables are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1capital to risk-weighted assets) and *Equity to Assets ratio.* The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from the regression using *CET1 Capital* as the independent variable, contains between 138-139 observations. The sample for regression when the *CET1 Capital* is used as the independent variable are contains 74 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	(1.1)	**(1.2)**	**(1.3)**	**(1.4)**
Variables	Loan yield	Loan yield	Loan yield	Loan yield
Bank characteristics				
Total Capital ratio (%)	0.036*			
	[0.012]			
Tier 1 Capital ratio (%)		0.072**		
		[0.016]		
CET1 Capital ratio (%)			0.034*	
			[0.014]	
Equity to Assets ratio (%)				0.019
				[0.082]
Loans to Earning Assets (%)	-0.008	-0.012	0.000	-0.006
	[0.006]	[0.006]	[0.004]	[0.008]
Interest Expense to Total Deposits (%)	0.224	0.241*	0.019	0.192*
	[0.096]	[0.096]	[0.049]	[0.079]
Macro characteristics				
T-bill yield (%)	0.145**	0.142*	0.557*	0.125*
	[0.040]	[0.048]	[0.216]	[0.044]
(T-bill yield)^2 (%)	-2.200	-1.784	-11.198	-1.523
	[1.463]	[1.461]	[5.354]	[1.021]
Term spread (%)	-0.037	-0.037	0.028	-0.029
	[0.024]	[0.027]	[0.045]	[0.045]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.010	0.010*	-0.001	-0.004
	[0.006]	[0.005]	[0.002]	[0.010]
N	138	138	74	139
Groups	4	4	4	4
R^2	0.862	0.882	0.923	0.854

*< 0. 10, **< 0.05, ***< 0.01

TABLE 2: CAPITAL RATIOS AND NET INTEREST MARGIN

This table shows fixed effects regressions on the dependent variable *Net Interest margin*. This variable is calculated as net interest income over all assets that generate interest income. The four independent variables are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio*. The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from the regression using *CET1 Capital* as the independent variable, contains between 172-173 observations. The sample for the regression when the *CET1 Capital* is used as the independent variable contains 75 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	(2.1)	**(2.2)**	**(2.3)**	**(2.4)**
Variables	Net Interest margin	Net Interest margin	Net Interest margin	Net Interest margin
Bank characteristics				
Total Capital ratio (%)	-0.001			
	[0.004]			
Tier 1 Capital ratio (%)		0.011		
		[0.008]		
CET1 Capital ratio (%)			0.019	
			[0.009]	
Equity to Assets ratio (%)				0.027
				[0.026]
Loans to Earning Assets (%)	0.002**	0.001	0.001	0.002
	[0.001]	[0.001]	[0.001]	[0.001]
Macro characteristics				
T-bill yield (%)	0.021	0.023	0.070	0.016
	[0.021]	[0.025]	[0.053]	[0.024]
(T-bill yield)^2 (%)	-0.132	-0.210	-1.406	-0.073
	[0.398]	[0.491]	[1.427]	[0.483]
Term spread (%)	0.008	0.004	0.011	0.002
	[0.005]	[0.005]	[0.005]	[0.005]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.002*	0.002**	-0.001	0.001
	[0.001]	[0.000]	[0.001]	[0.001]
N	172	172	75	173
Groups	4	4	4	4
R^2	0.740	0.767	0.562	0.763

*< 0. 10, **< 0.05, ***< 0.01

TABLE 3: CAPITAL SURPLUS RATIOS AND YEARLY GROWTH IN LOANS

This table shows fixed effects regressions on the dependent variable *Yearly Growth in Loans*. This variable constitute of the growth in loans to the public. The four independent variables are *Total Capital Surplus* (total capital to risk-weighted assets minus regulatory requirement), *Tier 1 Capital Surplus* (Tier 1 to risk-weighted assets ratio minus regulatory requirement), *CET1Capital Surplus* (common equity Tier 1 to risk-weighted assets ratio minus regulatory requirement) and *Internal Target Surplus (*disclosed capital ratio minus regulatory requirement). The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from regressions using *CET1Capital Surplus* and *Internal Target Surplus* as the independent variables, contains 145 observations. The sample for regressions when the *CET1Capital Surplus* or *Internal Target Surplus* are used as the independent variable contains between 66-68 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Variables	**(3.1)** Growth in Loans (one year)	**(3.2)** Growth in Loans (one year)	**(3.3)** Growth in Loans (one year)	**(3.4)** Growth in Loans (one year)
Bank characteristics				
Total Capital Surplus (%)	0.390*			
	[0.140]			
Tier 1 Capital Surplus (%)		0.583**		
		[0.166]		
CET1 Capital Surplus (%)			0.009	
			[0.997]	
Internal Target Surplus (%)				0.576
				[0.380]
Quarterly Growth in Loans (%)	-0.310	-0.312	-0.198	-0.220
	[0.214]	[0.199]	[0.086]	[0.098]
Market Capitalisation	0.985	0.889	1.225	1.255*
to Total Assets (%)	[0.568]	[0.520]	[0.697]	[0.397]
Net Charge-Offs to Total Assets (%)	-36.657**	-40.602**	-48.814	-51.709
	[8.950]	[10.487]	[31.960]	[32.391]
Macro characteristics				
ΔRepo rate (one lag) (%)	0.064**	0.066**	0.055	0.066**
	[0.019]	[0.018]	[0.024]	[0.018]
ΔUnemployment rate (one lag) (%)	-0.262	-0.191	- 5.542	-8.013*
	[0.865]	[0.820]	[4.691]	[3.134]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.965***	0.958***	1.009***	0.810***
	[0.047]	[0.047]	[0.091]	[0.091]
N	145	145	68	66
Groups	4	4	4	4
$\mathbf{R^2}$	0.726	0.723	0.628	0.770

*< 0. 10, **< 0.05, ***< 0.01

TABLE 4: CAPITAL SURPLUS RATIOS AND QUARTERLY GROWTH IN LOANS

This table shows fixed effects regressions on the dependent variable 1 quarter G*rowth in Loans*. This variable constitute of the growth in loans to the public. The four independent variables are *Total Capital Surplus* (total capital to risk-weighted assets minus regulatory requirement), *Tier 1 Capital Surplus* (Tier 1 to risk-weighted assets ratio minus regulatory requirement), *CET1Capital Surplus* (common equity Tier 1 to risk-weighted assets ratio minus regulatory requirement) and *Internal Target Surplus (*disclosed capital ratio minus regulatory requirement). The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from regressions using *CET1Capital Surplus* and *Internal Target Surplus* as the independent variables, contains 157 observations. The sample for regressions when the *CET1Capital Surplus* or *Internal Target Surplus* are used as the independent variable contains between 78-80 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Variables	**(4.1)** Growth in Loans (one quarter)	**(4.2)** Growth in Loans (one quarter)	**(4.3)** Growth in Loans (one quarter)	**(4.4)** Growth in Loans (one quarter)
Bank characteristics				
Total Capital Surplus (%)	-0.018			
	[0.102]			
Tier 1 Capital Surplus (%)		-0.067		
		[0.143]		
CET1 Capital Surplus (%)			-0.039	
			[0.268]	
Internal Target Surplus (%)				-0.044
				[0.195]
Growth in Loans (one lag) (%)	-0.142	-0.139	-0.059	-0.014
	[0.083]	[0.081]	[0.079]	[0.068]
Market Capitalisation	-0.291	-0.278	-0.397**	-0.333
to Total Assets (%)	[0.203]	[0.193]	[0.112]	[0.274]
Net Charge-Offs to Total Assets (%)	8.849	8.007	-6.152	-1.346
	[5.291]	[3.814]	[3.658]	[7.702]
Macro characteristics				
ΔRepo rate (one lag) (%)	0.009	0.009	0.001	0.011
	[0.006]	[0.006]	[0.013]	[0.008]
ΔUnemployment rate (one lag) (%)	0.352	0.339	-2.850	-1.899
	[0.656]	[0.641]	[2.574]	[3.033]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.052*	0.054*	0.009	0.044
	[0.019]	[0.022]	[0.045]	[0.045]
N	157	157	80	78
Groups	4	4	4	4
$\mathbf{R^2}$	0.446	0.447	0.465	0.525

*< 0. 10, **< 0.05, ***< 0.01

TABLE 5: CAPITAL RATIOS AND LOAN YIELD WINSORISED AT A ONE PER CENT LEVEL

This table shows fixed effects regressions on the dependent variable *Loan yield* winsorised at a one per cen level. This variable is calculated as interest income on loans over gross loans. The four independent variables are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio*. The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from the regression using *CET1 Capital* as the independent variable, contains between 138-139 observations. The sample for the regression where *CET1 Capital* is the independent variables contains 74 observations. Twelve yearly dummies from 2002 to 2013, and four quarterly dummies are included. Figures and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	(5.1)	**(5.2)**	**(5.3)**	**(5.4)**
Variables	Loan yield	Loan yield	Loan yield	Loan yield
Bank characteristics				
Total Capital ratio (%)	0.030			
	[0.014]			
Tier 1 Capital ratio (%)		0.063***		
		[0.008]		
CET1 Capital ratio (%)			0.033*	
			[0.014]	
Equity to Assets ratio (%)				-0.001
				[0.067]
Loans to Earning Assets (%)	-0.007	-0.012*	0.000	-0.006
	[0.005]	[0.006]	[0.004]	[0.007]
Interest Expense to Total Deposits (%)	0.224*	0.180*	0.019	0.136*
	[0.065]	[0.064]	[0.049]	[0.053]
Macro characteristics				
T-bill yield (%)	0.160**	0.157*	0.557*	0.145**
	[0.042]	[0.054]	[0.216]	[0.043]
(T-bill yield)^2 (%)	-2.200	-1.383	-11.198	-1.200
	[1.214]	[1.277]	[5.354]	[1.051]
Term spread (%)	-0.023	-0.023	0.028	-0.013
	[0.016]	[0.019]	[0.045]	[0.035]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.010	0.010**	-0.002	0.016*
	[0.006]	[0.003]	[0.002]	[0.006]
N	138	138	74	139
Groups	4	4	4	4
R^2	0.902	0.920	0.923	0.896

10, **< 0.05, ***< 0.01

TABLE 6: CAPITAL RATIOS AND NET INTEREST MARGIN WINSORISED AT A ONE PER CENT LEVEL

This table shows fixed effects regressions on the dependent variable *Net Interest margin* winsorised at a one per cent level. This variable is calculated as net interest income over all assets that generate interest income. The four independent variables are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio.* The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from the regression using *CET1 Capital* as the independent variable, contains between 172-173 observations. The sample for the regression when the *CET1 Capital* is used as the independent variable contains 75 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	(6.1)	**(6.2)**	**(6.3)**	**(6.4)**
Variables	Net Interest margin	Net Interest margin	Net Interest margin	Net Interest margin
Bank characteristics				
Total Capital ratio (%)	-0.001			
	[0.004]			
Tier 1 Capital ratio (%)		0.011		
		[0.008]		
CET1 Capital ratio (%)			0.019	
			[0.009]	
Equity to Assets ratio (%)				0.026
				[0.025]
Loans to Earning Assets (%)	0.002**	0.001	0.001	0.002
	[0.001]	[0.001]	[0.001]	[0.001]
Macro characteristics				
T-bill yield (%)	0.021	0.023	0.070	0.016
	[0.021]	[0.024]	[0.052]	[0.024]
(T-bill yield)^2 (%)	-0.142	-0.217	-1.363	-0.082
	[0.386]	[0.480]	[1.398]	[0.466]
Term spread (%)	0.008	0.004	0.011	0.002
	[0.005]	[0.005]	[0.005]	[0.005]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.002*	0.002**	-0.001	0.001
	[0.001]	[0.000]	[0.001]	[0.001]
N	172	172	75	173
Groups	4	4	4	4
R^2	0.734	0.767	0.567	0.761

*< 0. 10, **< 0.05, ***< 0.01

TABLE 7: CAPITAL SURPLUS RATIOS AND YEARLY GROWTH IN LOANS WINSORISED AT A ONE PER CENT LEVEL

This table shows fixed effects regressions on the dependent variable *Yearly Growth in Loans* winsorised at a one per cent level. This variable constitute of the growth in loans to the public. The four independent variables are *Total Capital Surplus* (total capital to risk-weighted assets minus regulatory requirement), *Tier 1 Capital Surplus* (Tier 1 to risk-weighted assets ratio minus regulatory requirement), *CET1Capital Surplus* (common equity Tier 1 to risk-weighted assets ratio minus regulatory requirement) and *Internal Target Surplus (*disclosed capital ratio minus regulatory requirement). The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from regressions using *CET1Capital Surplus* and *Internal Target Surplus* as the independent variables, contains 145 observations. The sample for regressions when the *CET1Capital Surplus* or *Internal Target Surplus* is used as the independent variable contains between 66-68 observations. Twelve-year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Variables	**(7.1)** Growth in Loans (during 4 quarters)	**(7.2)** Growth in Loans (during 4 quarters)	**(7.3)** Growth in Loans (during 4 quarters)	**(7.4)** Growth in Loans (during 4 quarters)
Bank characteristics				
Regulatory Surplus Total (%)	0.391* [0.140]			
Regulatory Surplus Tier 1 (%)		0.585** [0.167]		
Regulatory Surplus CET1 (%)			0.018 [0.988]	
Internal Target Surplus (%)				0.570 [0.378]
Growth in Loans (one lag) (%)	-0.312 [0.216]	-0.314 [0.201]	-0.203* [0.086]	-0.224 [0.101]
Market Capitalisation to Total Assets (%)	0.979 [0.561]	0.889 [0.514]	1.219 [0.695]	1.232** [0.384]
Net Charge-Offs to Total Assets (%)	-36.593** [8.777]	-40.540** [10.343]	-48.490 [31.603]	-51.535 [31.816]
Macro characteristics				
ΔRepo rate (one lag) (%)	0.064* [0.019]	0.065** [0.018]	0.055 [0.023]	0.066** [0.018]
ΔUnemployment rate (one lag) (%)	-0.262 [0.861]	-0.191 [0.818]	-5.611* [4.637]	-8.001* [3.018]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.965*** [0.047]	0.959*** [0.047]	1.001*** [0.090]	0.812*** [0.089]
N	145	145	68	66
Groups	4	4	4	4
R^2	0.727	0.723	0.428	0.771

*< 0. 10, **< 0.05, ***< 0.01

TABLE 8: CAPITAL SURPLUS RATIOS AND QUARTERLY GROWTH IN LOANS WINSORISED AT A ONE PER CENT LEVEL

This table shows fixed effects regressions on the dependent variable *Quarterly Growth in Loans* winsorised at a one per cent level. This variable constitute of the growth in loans to the public. The four independent variables are *Total Capital Surplus* (total capital to risk-weighted assets minus regulatory requirement), *Tier 1 Capital Surplus* (Tier 1 to risk-weighted assets ratio minus regulatory requirement), *CET1Capital Surplus* (common equity Tier 1 to risk-weighted assets ratio minus regulatory requirement) and *Internal Target Surplus (*disclosed capital ratio minus regulatory requirement). The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from regressions using *CET1Capital Surplus* and *Internal Target Surplus* as the independent variables, contains 157 observations. The sample for regressions when the *CET1Capital Surplus* or *Internal Target Surplus* are used as the independent variable contains between 78-80 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Variables	**(8.1)** Growth in Loans (during 1 quarter)	**(8.2)** Growth in Loans (during 1 quarter)	**(8.3)** Growth in Loans (during 1 quarter)	**(8.4)** Growth in Loans (during 1 quarter)
Bank characteristics				
Total Capital Surplus (%)	-0.038			
	[0.114]			
Tier 1 Capital Surplus (%)		-0.072		
		[0.145]		
CET1 Capital Surplus (%)			-0.043	
			[0.253]	
Internal Target Surplus (%)				-0.041
				[0.186]
Growth in Loans (one lag) (%)	-0.129	-0.127	-0.049	0.001
	[0.083]	[0.081]	[0.086]	[0.067]
Market Capitalisation to Total Assets (%)	-0.269	-0.256	-0.388**	-0.314
	[0.196]	[0.185]	[0.105]	[0.276]
Net Charge-Offs to Total Assets (%)	-8.015	-7.408*	7.525	0.104
	[4.309]	[2.969]	[3.707]	[6.972]
Macro characteristics				
ΔRepo rate (one lag) (%)	0.008	0.008	-0.001	0.008
	[0.007]	[0.007]	[0.010]	[0.007]
ΔUnemployment rate (one lag) (%)	0.315	0.305	-3.596	-2.757
	[0.621]	[0.610]	[2.023]	[2.502]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.051*	0.052*	-0.001	0.030
	[0.019]	[0.021]	[0.038]	[0.036]
N	157	157	80	78
Groups	4	4	4	4
R^2	0.447	0.448	0.490	0.544

*< 0. 10, **< 0.05, ***< 0.01

TABLE 9: CAPITAL RATIOS AND LOAN YIELD WITH ROE AND NET CHARGE-OFFS TO TOTAL ASSETS AS CONTROL VARIABLES

This table shows fixed effects regressions on the dependent variable *Loan yield* including *ROE* and *Net Charge-Offs to Total Assets* as a control variables. This variable is calculated as interest income on loans over gross loans. The four independent variables are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio*. The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from the regression using *CET1 Capital* as the independent variable, contains 116 observations. The sample for regression when the *CET1 Capital* is used as the independent variable contains 73 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	(9.1)	**(9.2)**	**(9.3)**	**(9.4)**
Variables	Loan yield	Loan yield	Loan yield	Loan yield
Bank characteristics				
Total Capital ratio (%)	0.028			
	[0.014]			
Tier 1 Capital ratio (%)		0.075***		
		[0.013]		
CET1 Capital ratio (%)			0.039*	
			[0.015]	
Equity to Assets ratio (%)				0.012
				[0.062]
Loans to Earning Assets (%)	-0.008	-0.013	-0.001	-0.006
	[0.008]	[0.006]	[0.003]	[0.008]
Interest Expense to Total Deposits (%)	0.196	0.220	-0.005	0.162
	[0.003]	[0.103]	[0.040]	[0.082]
ROE (%)	0.004	0.001	-0.003	0.003
	[.111]	[0.003]	[0.002]	[0.004]
Net Charge-Offs to Total Assets (%)	-0.186	-0.888	0.221	0.109
	[1.070]	[1.060]	[0.590]	[0.857]
Macro characteristics				
T-bill yield (%)	0.128*	0.149*	0.641	0.103
	[0.045]	[0.047]	[0.283]	[0.047]
(T-bill yield)^2 (%)	-1.996	-1.947	-13.021	-1.245
	[1.084]	[1.274]	[6.625]	[0.932]
Term spread (%)	-0.047	-0.038	0.047	-0.045
	[0.038]	[0.026]	[0.069]	[0.051]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.015	0.015*	0.013**	0.017
	[0.008]	[0.005]	[0.004]	[0.009]
N	116	116	73	116
Groups	4	4	4	4
R^2	0.859	0.882	0.931	0.853

10, **< 0.05, ***< 0.01

TABLE 10: CAPITAL RATIOS AND NET INTEREST MARGIN INCLUDING ROE AND NET CHARGE-OFFS TO TOTAL ASSETS AS A CONTROL VARIABLES

This table shows fixed effects regressions on the dependent variable *Net Interest Income to Earning Assets* including *ROE* and *Net Charge-Offs to Total Assets* as a control variables. This variable is calculated as net interest income over all assets that generate interest income. The four independent variables are *Total Capital ratio* (Total capital to risk-weighted assets) *Tier 1 Capital ratio* (Tier 1 capital to risk-weighted assets), *CET1 Capital ratio* (common equity Tier 1 capital to risk-weighted assets) and *Equity to Assets ratio*. The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from the regression using *CET1 Capital* as the independent variable, contains 146 observations. The sample for the regression when the *CET1 Capital* is used as the independent variable contains 74 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	(9.1)	**(9.2)**	**(9.3)**	**(9.4)**
Variables	Net Interest margin	Net Interest margin	Net Interest margin	Net Interest margin
Bank characteristics				
Total Capital ratio (%)	-0.004			
	[0.002]			
Tier 1 Capital ratio (%)		0.012		
		[0.009]		
CET1 Capital ratio (%)			0.021	
			[0.010]	
Equity to Assets ratio (%)				0.030
				[0.021]
Loans to Earning Assets (%)	0.002*	0.001	0.000	0.002
	[0.001]	[0.001]	[0.001]	[0.001]
ROE (%)	0.002***	0.001**	-0.000	0.002***
	[0.000]	[0.000]	[0.001]	[0.000]
Net Charge-Offs to Total Assets (%)	-0.217	-0.458	-0.109	-0.397**
	[0.115]	[0.198]	[0.173]	[0.115]
Macro characteristics				
T-bill yield (%)	0.018	0.031**	0.080	0.021
	[0.009]	[0.006]	[0.052]	[0.010]
(T-bill yield)^2 (%)	0.030	-0.253	-1.621	-0.060
	[0.261]	[0.332]	[1.346]	[0.318]
Term spread (%)	0.012	0.011	0.013	0.006
	[0.009]	[0.010]	[0.011]	[0.009]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.001	-0.000	0.001	-0.000
	[0.001]	[0.002]	[0.001]	[0.001]
N	146	146	74	146
Groups	4	4	4	4
$\mathbf{R^2}$	0.743	0.770	0.570	0.773

*< 0. 10, **< 0.05, ***< 0.01

TABLE 11: CAPITAL SURPLUS RATIOS AND YEARLY GROWTH IN LOANS INCLUDING ROE AND CHANGE IN GDP RATE AS CONTROL VARIABLES

This table shows fixed effects regressions on the dependent variable *Yearly Growth in Loan* including *ROE* and *change in GDP rate* as control variables. The four independent variables are *Total Capital Surplus* (total capital to risk-weighted assets minus regulatory requirement), *Tier 1 Capital Surplus* (Tier 1 to risk-weighted assets ratio minus regulatory requirement), *CET1Capital Surplus* (common equity Tier 1 to risk-weighted assets ratio minus regulatory requirement) and *Internal Target Surplus (*disclosed capital ratio minus regulatory requirement). The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from regressions using *CET1Capital Surplus* and *Internal Target Surplus* as the independent variables, contains 140 observations. The sample for regressions when the *CET1Capital Surplus* or *Internal Target Surplus* are used as the independent variable contains between 65-67 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Variables	**(11.1)** Growth in Loans (one year)	**(11.2)** Growth in Loans (one year)	**(11.3)** Growth in Loans (one year)	**(11.4)** Growth in Loans (one year)
Bank characteristics				
Regulatory Surplus Total (%)	0.443**			
	[0.138]			
Regulatory Surplus Tier 1 (%)		0.649*		
		[0.218]		
Regulatory Surplus CET1 (%)			0.283	
			[1.243]	
Internal Target Surplus (%)				0.639
				[0.335]
Growth in Loans (one lag) (%)	-0.372	-0.372	-0.131	-0.195
	[0.277]	[0.265]	[0.150]	[0.128]
Market Capitalisation to Total Assets (%)	1.106	0.971	1.680**	1.766**
	[0.590]	[0.575]	[0.418]	[0.382]
Net Charge-Offs to Total Assets (%)	-35.052**	-38.871*	-34.904	-19.316
	[10.685]	[12.497]	[39.332]	[43.415]
ROE (%)	-0.127	-0.116	-0.229	-0.089
	[0.107]	[0.123]	[0.143]	[0.135]
Macro characteristics				
ΔRepo rate (one lag) (%)	0.047**	0.048**	0.055	0.071*
	[0.015]	[0.015]	[0.027]	[0.030]
ΔGDP rate (one lag) (%)	2.080**	2.163**	1.900	1.787
	[0.397]	[0.432]	[1.255]	[1.263]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.960***	0.953***	0.921***	1.067***
	[0.046]	[0.050]	[0.114]	[0.031]
N	140	140	67	65
Groups	4	4	4	4
R^2	0.755	0.756	0.428	0.775

*< 0. 10, **< 0.05, ***< 0.01

TABLE 12: CAPITAL SURPLUS RATIOS AND QUARTERLY GROWTH IN LOANS WITH ROE AND CHANGE IN GDP RATE AS CONTROL VARIABLES

This table shows fixed effects regressions on the dependent variable G*rowth in Loans* including *ROE* and *change in GDP rate* as control variables. This variable constitute of the growth in loans to the public. The four independent variables are *Total Capital Surplus* (total capital to risk-weighted assets minus regulatory requirement), *Tier 1 Capital Surplus* (Tier 1 to risk-weighted assets ratio minus regulatory requirement), *CET1Capital Surplus* (common equity Tier 1 to risk-weighted assets ratio minus regulatory requirement) and *Internal Target Surplus (*disclosed capital ratio minus regulatory requirement). The numbers in the first row for every variable show the coefficients while the numbers in the second row in brackets show the robust standard errors. The data sample consists of the four major Swedish banks, SEB, Handelsbanken, Nordea and Swedbank. The sample for all regressions, expect from regressions using *CET1Capital Surplus* and *Internal Target Surplus* as the independent variables, contains 152 observations. The sample for regressions when the *CET1Capital Surplus* or *Internal Target Surplus* are used as the independent variable contains between 77-79 observations. Twelve year dummies, one for each year from 2002 to 2013, and four quarterly dummies are included. Numbers and ratios collected from balance sheets are all reported as incoming balance. The regressions are also controlled for heteroskedacticity. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Variables	**(12.1)** Growth in Loans (during 1 quarter)	**(12.2)** Growth in Loans (during 1 quarter)	**(12.3)** Growth in Loans (during 1 quarter)	**(12.4)** Growth in Loans (during 1 quarter)
Bank characteristics				
Regulatory Surplus Total (%)	-0.068			
	[0.116]			
Regulatory Surplus Tier 1 (%)		-0.106		
		[0.177]		
Regulatory Surplus CET1 (%)			-0.088	
			[0.223]	
Internal Target Surplus (%)				-0.018
				[0.202]
Growth in Loans (one lag) (%)	-0.154	-0.153	-0.076	-0.048
	[0.080]	[0.079]	[0.057]	[0.066]
Market Capitalisation to Total Assets (%)	-0.394	-0.372	-0.557*	-0.407
	[0.186]	[0.176]	[0.202]	[0.375]
Net Charge-Offs to Total Assets (%)	-6.489	-5.798	8.488	1.410
	[7.966]	[6.461]	[4.635]	[8.361]
ROE (%)	0.062	0.061	0.076	0.048
	[0.046]	[0.046]	[0.042]	[0.048]
Macro characteristics				
ΔRepo rate (one lag) (%)	0.004	0.004	0.004	0.010
	[0.008]	[0.008]	[0.013]	[0.010]
ΔGDP rate (one lag) (%)	0.249	0.234	0.427	0.457
	[0.597]	[0.626]	[0.796]	[0.978]
Year dummies	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Intercept	0.051**	0.052**	0.044***	0.032
	[0.012]	[0.015]	[0.007]	[0.048]
N	152	152	79	77
Groups	4	4	4	4
R^2	0.449	0.451	0.465	0.525
*< 0. 10, **< 0.05, ***< 0.01				