Copenhagen Business School 2016
Cand.merc. Applied Economics and Finance

The implementation of the CRR/CRD IV

– An analysis of the risk and capital requirements for the Swedish Systemically Important Financial Institutions

Master´s thesis
Copenhagen Business School
12th of May 2016

Author
Alexandra Takman

Supervisor
Poul Kjær

Number of pages
79

Number of characters
130,388

Abstract

The aim of the thesis is to investigate the robustness of the four Swedish Systemically Important Financial Institutions (SIFIs) and whether it is related to CRR/CRD IV.

The financial crisis of 2008 revealed vulnerabilities in the regulation and supervision of the banking system at a global level. One of the main problems was found in the insufficient quality and level of the capital base among financial institutions which posed threats to their loss absorbing capacity. The prevalent regulation under Basel II allowed banks to use unconventional methods to effectively hide debt and hold less loss-absorbing capital. To address the problems, the Basel committee updated its capital adequacy framework. The implementation of the Basel III agreement in the EU is commonly referred to as CRR/CRD IV.

The resilience of the banking sector is highly prioritized among policy makers due the society´s dependence on financial institutions. Due to the special features of the Swedish financial sector, which makes it particularly vulnerable in times of distress, it was decided that the implementation of the capital requirements under CRR/CRD IV should be stricter in Sweden.

To address the research problem, the author has analyzed the capital ratios of the four Swedish SIFIs with focus on the risk exposure amount. In addition, the liquidity risk is analyzed. The data is retrieved from the Pillar 3 reports of risk and capital management. The analysis considers the period of the four years prior the first year of implementation (2010-2013) as well as the first year of implementation (2014) of the CRR/CRD IV.

The conclusion of the research is that the reduction in risk perceived by the market during the analyzed period is only partly attributable to the CRR/CRD IV.

The loss absorbing capacity has increased for all four banks during the period. The total capital ratio has increased with an average of 6,9 percentage points and the CET1-ratio has increased with an average of 5,9 percentage points. The first year of the implementation coincide with the first year where increased capital ratios were mainly attributable to increases in capital for three of the four banks. However, during the period prior the first year of implementation, the increased capital ratios were mainly due to external factors through decreased Risk Weights (RWs) applied to the calculations of the risk exposure amount in the credit portfolio. The RWs show a similar trend for all four banks with the largest decrease attributable to the corporate exposure. Low risk premiums in the interbank market and record low levels of the federal funds rate indicate

that some of the risk reduction during the period prior the first year of implementation is attributable to the transmission mechanism of monetary policy.

The results of the research support the existing theory regarding the difficulty of assessing the total risk in the financial system and highlight the importance of being critical to the prevalent models. It illustrates the quandary that policy makers face in their work of developing efficient financial regulation and questions whether there is a best practice to reach soundness in the financial system.

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1 Introduction

The purpose of this section is to introduce the reader to the topic of which the thesis is built on.

1.1 Background

On September 18, 2008, the world economy experienced a systemic financial crisis which made the credit markets unable to function for the following four weeks and put the international financial system close to a collapse (Arner, 2009). The crisis was the most substantial economic crisis in the U.S. since the great depression and has had substantial effects for the world economy (Bolton, 2009).

Prior and during the crisis, the regulation in most western countries was under the Basel II Framework. According to the European Commission (2013), the crucial problem of the financial crisis were found in the banks' quality and level of the capital base, the availability of the capital base, liquidity management and the effectiveness of the internal and corporate governance. In addition, the lower capital held due to the calculations by internal methods in the Basel II regulation posed significant threats to the loss-absorbing capacity. Archaraya & Richardson (2009) argue that banks' efforts to circumvent the capital-adequacy requirements are crucial in the explanation of the financial crisis. One of the methods that the banks used was the creation of off-balance-sheet entities (OBSEs). With loans placed in these OBSEs, the bank did not need to maintain capital against them. Thus, while the assets on banks' balance sheets doubled between 2004 and the middle of 2007, the regulatory assessment of the risk of these assets grew at a far slower rate. Regulators deemed banks to be relatively safely invested, because the assets were rated AAA, enabling banks to double their leverage and thus the quantity of profitable loans they could make. When the Federal Reserve increased the federal funds rate it triggered the default rates on the sub-prime mortgage loans and panic spread in the financial system. Credit spreads sky-rocketed, the interbank lending market ceased to function and the banks had to return the off-balance sheet items loans to the balance sheet. The losses wiped out significant bank capital and threatened banks solvency.

By the end of September 2008, the panic in the US had spread to the European financial markets and interbank lending at longer maturities had ceased almost completely. The pressure on banks to deleverage was acute. The response by Eurozone banks resulted in a reduction in the growth of their risk-weighted assets, mainly due to tighter lending standards and cutting costs. This started macro-economic concerns and Eurozone economies were heading towards a period of recession (Casu, Girardone & Molyneux; 2015). Also Sweden was affected and was hit mainly through the macro-economic channel. The cause was predominantly driven by the falling export demand as Sweden's exports accounts for a large fraction of the GDP (Elmér et al., 2012).

1.2 Problem statement

The financial crisis revealed vulnerabilities in the regulation and supervision of the banking system at European and global level. To address the main problems that was identified during the financial crisis, the Basel committee issued the capital adequacy framework called Basel III in December 2010 (Financialcad, 2011). The implementation of the Basel III agreement in the EU is commonly referred to as the CRR/CRD IV and was adopted by the European Commission in July 2011. The legislative package consists of a directive and a regulation and implementation began at 1st of January 2014. The overarching goal of the new regulation is to strengthen the resilience of the EU banking sector so it will be better placed to absorb economic shocks while ensuring that banks continue to finance economic activity and growth (European Commission, 2013).

In late 2011, The Swedish Financial Supervisory Authority and the Swedish Central Bank decided, that Sweden should implement both stricter and a more rapid implementation of the requirements for their largest banks. The more restrictive implementation of the CRR/CRD IV in Sweden is motivated by the fact that the Swedish banking system is particularly vulnerable in times of financial distress. The Swedish banking sector accounts for a large share of the Swedish GDP compared to other countries. This is in part due to their large foreign operations and the substantial exposure to foreign currency, which isolated and in terms of diversification should have a positive impact on risk. However, the internationalization poses difficulties in a stressed situation as it involves more authorities with different legal frameworks. The net effect is that the consequences of a banking crisis are potentially large from a socio-economic point of view. Another factor that increases the risk is the high concentration in the banking sector. The four largest banks; Swedbank, Handelsbanken(SHB), SEB and Nordea dominates the Swedish market and are engaging in large amounts of interbank lending. If one bank experiences trouble, the contagion effect can be severe (Sveriges riksbank, 2011a).

Some of the benefits discussed are that higher capital reduces the probability of default in a stressed situation. Further, as the shareholders needs to bear a larger share of the losses, the moral hazard problem with excessive risk-taking should be mitigated. By holding less debt and more capital, the tax benefits associated with debt is effectively leading to a redistribution of wealth between the banks shareholders and all tax payers. Moreover, a capital buffer allows banks to maintain lending to a greater extent in a stressed situation. This mitigates the macroeconomic consequences of an economic downturn. However, if the banks choose to compensate the higher financing costs with higher lending rates and this results in reduced lending, this might have a negative impact on the GDP. The negative effect might be mitigated by the positive impact the lower

risk will have on the compensation that creditors and shareholders require. This in turn will lower the capital costs (Sveriges Riksbank, 2011a).

In light of these facts, the author seeks to analyze the effects of the capital requirements on the risk for the Swedish SIFI banks. This has led up to the research question.

1.3 Research question

”Have the four Swedish SIFIs become more robust as a result of the CRR/CRD IV?”

2 Methodology

This section outlines the scope of the thesis and describes which method the author has chosen to answer the research question.

2.1 Research Design

The analysis is based on a quantitative financial analysis mainly consistent of risk exposure as well as a qualitative strategic assessment of the four SIFIs. The quantitative analysis is based on a time-series for five years and aims at measuring the change in risk during the period. The parameters chosen to measure the risk is based on the capital requirement calculations according to the CRR/CRD IV. The qualitative analysis aims at explaining the strategic focus related to risk management for the four SIFIs. The strategic analysis is cross-sectional and hence, only reveals data for 2014.

To conclude that the Swedish SIFI banks have become more robust as a consequence of CRR/CRD IV is a challenging task as there are numerous factors that affect the risk for the banks. Optimally, one would like to do a scenario analysis which compares one situation where the CRR/CRD IV applies with one scenario where it does not. However, as for all research which addresses the effects of legislative change, it is difficult to find a perfect comparable control group and hence requires an approach which is plausible to execute in real-life (Jacobsen, 2005). In this case, the possibility to compare SIFIs in two different countries, one which was affected by the regulation and one which was not was considered by the author. However, the issue with such an approach is the risk of the two objects not being fundamentally comparable. The rejection is also motivated by the much larger scope that it requires.

Jacobsen (2005) presents an alternative approach by focusing on processes and mechanisms which cause effects as well as theory that can explain how the effects arise. The author has therefore built the thesis around the assumptions of macro-economic mechanisms as well as financial theory and previous research on the topic.

2.2 Delimitations

The problem that the author seeks to investigate is of a holistic character and hence, requires a wide research question. As a consequence, the direction of the research is towards changes in risk- and capital management which are relevant for the discussion regarding these holistic effects explained in the problem statement.

The author has chosen to investigate Sweden due to her previous knowledge of the Swedish financial system. Due to the special features of the Swedish financial system, it becomes particularly interesting to investigate how the single rule book applies and function. The analysis is limited to the investigation of the four Domestic Systemically Important Financial Institutions, referred to as SIFIs. This is motivated by their importance for the Swedish financial system and hence the society as a whole. As the rationale for the CRR/CRD IV is related to the issues of the society´s dependence of financial institutions as a whole, the author assess the SIFIs as most relevant for this particular purpose.

For the purpose of answering the research question, the author is interested in the responses by the SIFIs and what mechanisms they are using to cope with the new regulation. Although the CRR/CRD IV is regarding changes in both capital, liquidity and disclosure agreements the author has chosen to focus on the components of the capital ratios in the Pillar 1. This is justified by the fact that the main problems during the financial crisis were attributable to the capital. In addition, it is relevant to analyze the capital ratios in terms of the risk and return trade-off. Another argument is that the components of the capital ratios can be quantifiable in a relative straightforward way and hence easier to analyze than for example how the disclosure agreements effect the risk.

The main focus of the analysis of the capital ratios is the Risk Exposure Amount (REA). This is justified by the fact that REA is reflecting the risk in a way that is comparable and uniform between banks and years. The focus on the Credit risk exposure is motivated by the fact that it constitutes the largest part of the total exposure. The justification of not focusing on how the banks have increased the capital itself is motivated by it being subject to little discretion and hence less relevant for the purpose of the thesis. However, the quality of the capital is assessed and measured by the CET1-ratio.

The selection of the particular time period is motivated by the desire to analyze the year prior the first proposal of the Basel III and CRR/CRD IV, followed by the years while the banks were supposedly preparing to adjust to the new regulation, and finally the first year of implementation. The goal of the thesis is to analyze what changes in capital- and risk management the banks have done between 2010 and 2014. The purpose is not to assess the full effect of the CRR/CRD IV as this is not possible until the full implementation is finished. However, the results from the research may give some important implications that may be useful when assessing the effects after the implementation is completed. These are discussed later in the thesis. The explanation that the year of 2015 is not chosen is because the Pillar 3 reports for 2015 was not available when the author began the research. However, the implementation should be visible also in 2014 and hence, the exclusion of 2015 is justified.

Perhaps the most relevant alternative approaches to investigate the research problem are by conducting stress tests or interviews. The exclusion of using stress tests is motivated by the inability of stress tests to fully assess the effect on banks and the society of a stressed situation. This is justified by the understatement of risk that has occurred before and the limitations of macro stress tests to assess the build-up of risks on banks' balance sheets, the non-linear nature of systemic risks or macro-feedback loops as well as counterparty or liquidity risk (Henry & Kok, 2013). The alternative to conduct interviews with the banks is not desirable either as they might be biased in their responses.

2.3 Limitations

The holistic approach of the research puts limitations on the level of detail of the research. Hence, the necessary simplifications may have implications for the conclusions drawn. For example, the author has not considered changes in funding and asset allocation. As this affect diversification which is an important aspect of the risk and capital management, the author stresses the importance of the limitations that this creates. The limitations are however motivated by the scope of the thesis and are considered carefully before any conclusions are drawn.

Another important limitation is attributable to the causality issue relating to changes in parameters that reflect the risk for the banks. The author emphasizes the difficulty of eliminating all possible explanatory factors on changes in risk with a research design which is not based on statistical tests. As a consequence, there are limited empirical results which can support whether the change in risk are due to regulations related to

CRR/CRD IV. Instead, the author opts for an explanatory approach and argues for the changes on the basis of a thorough discussion based on the relevant theory and previous research.

The limitations of the market exposure analysis and liquidity analysis are mainly attributable to the difficulty of quantifying the net effect of the macro-economic developments and the responses in monetary policy. As the exact funding costs for the banks are not publicly available it is difficult to assess to what extent the funding costs are affected by changes in risk. Therefore the author has only used the spreads as an indication of risk for all banks and is therefore not able to exactly quantify the effects of the funding costs.

Due to the limited scope of the thesis and the small contribution of market risk on total REA, the market risk analysis is only considering trends in the total market risk exposure. However, if the scope of the thesis was larger, the author would analyze maturities of credit exposures together with changes in yield curves to assess interest rate risk. To analyze currency risk the author would analyze net exposures for different exposures in the trading book and the banking book together with changes in exchange rates.

The risk reflected in CDS-spreads might be attributable to changes in other parts of the banks' risk and capital management as well as other external factors. Hence, the changes in capital ratios and CDS-spreads cannot be perfectly related.

2.3.1 Validity

The internal validity measure whether the author have backup in the data for the conclusions that are drawn while the external validity is regarding whether the study can be generalized to a larger population (Jacobsen, 2005).

The financial analysis is comparing parameters over time and hence, tries to identify changes in risk. The research is not testing a hypothesis, but answers the research question through careful evaluation of empirical results with support in relevant theory. The author has been careful in terms of concluding based on the results and stresses the importance of the limitations of the thesis. In this way, the author is confident that there are no conclusions drawn that has no valid backup and hence the study has internal validity.

The purpose of the study is not to generalize and is therefore not valid for a larger population. However, due to the nature of the problems of the financial crisis and the interconnectedness of the financial system, the results retrieved from the thesis may nevertheless be relevant to investigate further in other contexts.

2.3.2 Reliability

The comparability of numbers between years in the financial analysis may be affected by the transition period applied from the previous regulation. The underlying numbers of the financial analysis are adjusted to assure comparability between time and banks. The author has been clear and observant of the limitation that such adjustments may impose. For example, some of the numbers are reported with and without transitional rules. However, the author is confident that no adjustments that are made are threatening the reliability of the financial analysis.

Further, the comparability between banks may be affected by the slightly different way that for example credit exposure classes are reported. However, the Pillar 3 reports are characterized by considerable disclosure and subject to close scrutiny by financial authorities. This secures comparability and hence reliable results.

3 Theory

This section provides the relevant theoretical basis for the thesis.

3.1 Return on Equity and the maximization of shareholder value

The return on equity (ROE) measures the profitability taking into account both operating and financial leverage. It measures owners accounting return on their investments in a company (Petersen & Plenborg, 2012).

For any privately owned bank, management´s goal is to maximize shareholders' value. Higher returns are reflected in higher market valuations of a company´s shares. The heart of bank financial management is risk management and the task comprises of how to set appropriate targets for a bank´s returns and corresponding risks undertaken (Casu, Girardone & Molyneux; 2015).

3.2 Capital structure

Proposition II of the Modigliani-Miller-theorem shows that the leverage affect the total cost of capital. The first proposition can be used to illustrate the relationship. The MM proposition I states that:

Equation 1: MM proposition I

$$E + D = U = A$$

Where E and D is the market value of equity and debt if the firm is levered. U is the market value of equity if the firm is unlevered and A is the market value of the firm's assets. Hence, the total market value of the firm´s securities is equal to the market value of its assets, whether the firm is unlevered of levered. However, while debt in general is cheaper, it increases the risk and therefore the cost of capital of the firm's equity. To illustrate, the first equality in MM proposition can be interpreted in terms of homemade leverage: By holding a portfolio of the firm´s equity and debt, the cash flows from holding unlevered equity can be replicated. The return of a portfolio is equal to the weighted average of the returns of the securities in it. This equality implies the following relationship between the returns of levered equity (RE), debt (RD), and unlevered equity (RU):

Equation 2: Unlevered equity

$$\frac{E}{E+D}R_E + \frac{D}{E+D}R_D = R_U$$

Solving for RE, the following expression for the return of levered equity is obtained:

Equation 3: Return on levered equity

$$R_E = R_U + \frac{D}{E}(R_U - R_D)$$

RU is interpreted as the risk without leverage while the rest of the second equality is the additional risk due to leverage. The amount of additional risk depends on the amount of leverage, measured by the firms market value of debt to equity ratio, D/E. A high leverage ratio allows the firm to increase returns when the firm performs well (RU>RD), but makes them drop even lower when the firm performs poorly (Berk & DeMarzo, 2014).

3.3 Risk and return

3.3.1 Risk aversion

The reason for why risk has a price can be explained through the concept of risk aversion. Investors prefer to have a safe income rather than a risky one even though the average return is the same. The price of risk is quantifiable through risk premiums. The risk premium of a security represents the excess return in addition to the risk-free return that investors expect to earn to compensate them for holding risk. The size of the risk premiums is based on how variable the returns are. Given an average expected return, a security with more volatile returns must pay investors a higher risk premium (Berk & DeMarzo, 2014).

3.3.2 Portfolio theory

The portfolio theories of Sharpe (1970) or Fama & Miller (1972) relies on the proposition that an investor consider both the expected return on his overall portfolio and the amount of uncertainty, or variability, associated with that return. An efficient portfolio achieves the maximum possible expected return for a given amount of risk. The key is the concept of diversification (Bennett, 1984).

Hence, investors would not choose to hold a portfolio that is more volatile unless they expected to earn a higher return. The risk is well defined under the assumptions of CAPM. The first assumption says that investors can buy and sell all securities at competitive market prices and can borrow and lend at the risk-free interest rate. The second assumption states that investors are rational and only hold efficient portfolios. The third assumption states that investors have homogenous expectations (Berk & DeMarzo, 2014). If the institution is publicly listed and markets are efficient, returns are proportional to the risks taken (Casu, Girardone & Molyneux; 2015).

However, applying the theoretical principles of portfolio management to loan portfolios is not straightforward. First, there is a certain amount of asymmetry in bank lending as the "upside potential" return is contractually limited (Bennett, 1984). Another issue relates to the fact that bank loans are often non-tradeable (Casu, Girardone & Molyneux; 2015). This violates the first assumption regarding competitive market prices. As bank loans in most cases perform according to a contract with comparatively little observable variation, it becomes difficult to estimate the risk based on historical performance. In addition, it is also troublesome to estimate the expected returns. The expected returns usually cannot be measured independently of the risk because of interactive effects. A weaker loan not only carries the potential of variable returns but also more potential covariance of return with other loans. This is especially true to the extent that common factors affect the borrowers (Bennett, 1984). According to Slijkerman et al. (2012), diversification lowers the risk of isolated shocks for a financial entity, but may simultaneously increase the systemic risk.

3.3.3 Systemic risk

In defining systemic risk, Gerlach (2009) highlights three important characteristics: first, it has to impact the financial system as a whole. Second, there must be interlinkages between institutions which make adverse shocks affecting one or a few institutions to spread to the financial system at large. Third, risk can be defined as systemic in situations where financial disruptions typically would lead to highly adverse macro-economic effects in the absence of rapid and strong policy responses. According to Brunnermeier & Oehmke, (2012)

systemic risk is mainly attributable to two elements: it builds up in the background during the run-up phase of imbalances or bubbles and materializes only when the crisis erupts.

The desire to measure the systemic risk has become particularly important since the implementation of Basel II but is however still in its infancy. In general, risk measures for individual financial institutions are typically not a good measure for systemic risk. This is because the sum of individual risk measures is not capturing the risk that the stability of the whole financial system is in danger. Further, institutions that are perceived as individually equally risky are not equally risky to the system. This is due to their spillover effects during financial distress. Ideally, one would like to have a risk measure which allocates the financial institution's individual contributions to systemic risk so that the sum of all risk contributions equals the total systemic risk. However, it might be challenging to capture both total and marginal risk contributions in one measure as the relationship between the two might be non-linear. In addition, the marginal contribution of one institution may depend on the risks taken by other institutions. Further, simple leverage measures may not capture leverage that is embedded in certain assets held by financial institutions (Brunnermeier & Oehmke, 2012).

3.3.4 Moral hazard

A moral hazard problem is defined as an agent undertaking actions that cannot be observed by other agents in the economy. The moral hazard problems are particularly large in banks because of the information asymmetry between the banks and depositors (Borchgrevink, Søvik & Vale; 2013). The safety net arrangements may also create moral hazard problems. An example of moral hazard is known as the too big to fail (TBTF) and applies to large and systemically important institutions. Banks anticipate that they will be bailed out by the authorities, with the tax payers money, if they get into financial difficulty and this results in bigger risk-taking (Casu, Girardone & Molyneux; 2015).

3.3.5 The role of the Central bank and the transmission mechanism of monetary policy

The transmission mechanism is the process through which monetary policy decisions affect the economy in general and the price level in particular. Given the monopoly power over the issuing of money, the central bank can fully determine the federal funds rate. The changes in federal funds rates directly affect money-market interest rates and indirectly lending and deposit rates which are set by banks to their costumers (ECB, 2016a).

A significant amount of research has been done on the monetary transmission mechanism. The research is based on the counteractive monetary policy during distressed economic developments. However, according to Borio & Zhu (2012) insufficient attention has been paid to the link between monetary policy and the perception

and pricing of risk by economic agents, what might be referred to as the risk-taking channel. They argue that changes in the financial system and prudential regulation may have increased the importance of the risk-taking channel and that prevailing macroeconomic paradigms and associated models are not well suited for capturing it, thereby also reducing their effectiveness as guides to monetary policy. According to Gambacorta (2009) the mechanism of expansive monetary policy works in at least two ways: The low returns on investments may increase incentives for banks to take on more risk. Second, low interest rates affect valuations, incomes and cash flows, which in turn can modify how banks measure risk. He argues that monetary policy is not fully neutral from a financial stability perspective. Gambacorta (2009) shows evidence that low interest rates over an extended period causes an increase in banks' risk taking.

3.4 Compliance costs

According to Alfon & Andrews (1999) are the notion of incremental compliance costs the costs to firms and individuals of those activities required by regulators what would not have been undertaken in absence of regulation. The higher compliance costs for the banks might be passed on to consumers, resulting in higher costs of financial services and possibly less intermediation business. In addition, regulatory costs may act as a barrier to entry in the market and this may consolidate monopoly positions.

4 The Banking industry

The purpose of this section is to give the reader an introduction to the specific features of the banking industry relevant for the problem statement. The aim is to explain the rationalization of financial regulation by outlining the important role of financial institutions to the society as a whole.

4.1 Activities and services

The main function of banks is to collect funds from unit in surplus and lend to units in deficit. Deposits are usually small in size, have low risk and are liquid. Loans are usually large in size, have high risk and are illiquid. Banks role is therefore to transform the size, maturity and risk of the funds for them to correspond with the needs and objectives of the borrowers and lenders.

Many of the services offered by financial institutions include both intermediation and non-intermediation activities, such as payment services. An important distinguishing characteristic between the two is the creation

of assets and liabilities. A bank deposit is directly defined as a liability for the bank. If the banks on-lend deposits, it creates an asset that in turn create revenue in terms of interest (Casu, Girardone & Molyneux; 2015).

4.2 Evolvement of the banking industry

4.2.1 Traditional banking

Traditional banking consisted of taking deposits and making loans and the majority of their income consisted of the profits from the lending business. Net interest margins were the main driver of bank profitability. The core business was therefore focused on maximizing interest margins and control operating costs. In the 80s, competition rose as regulation changed. Banks in both EU and the US was allowed to undertake a broad range of financial services activity. Capital restrictions that limited the free flow of funds across national boundaries gradually disappeared, facilitating the growth of international operations. In the 90s, technology and communication opened up even more possibilities to further extend the financial services activity (Casu, Girardone & Molyneux; 2015).

4.2.2 Modern Banking

Today, banks' are also offering insurance, securities/investment banking, pensions and other financial services. The revenues, such as fees, from these additional products, complement and diversify the earnings, which is necessary in the increasingly competitive environment. The strategic focus is to maximize the return to shareholders by maximizing the return on equity (Casu, Girardone & Molyneux (2015).

4.3 Financial management

The role of financial management in receiving the goal of maximizing shareholder value can be divided into investment decisions, financing decisions and the control of resources.

Due to the special role that banks play in the overall economy, the goal is to manage asset and liabilities in a way that maximizes profits while being safe and sound. The following sections will describe some of the tools that the banks have in fulfilling this goal (Casu, Girardone & Molyneux; 2015).

4.3.1 Asset- liability management (ALM)

A bank manages its assets well when it maximizes the returns on loans and securities. To minimize risks, a bank aims at diversifying its portfolio. Moreover, to avoid liquidity pressure a bank must decide on the optimal level of liquid assets, taking the trade-off between profitability and liquidity into account. For the liabilities, a bank

aims at acquiring funds at low cost in the money market as well as minimizing the interest paid by deposits (Casu, Girardone & Molyneux; 2015).

4.3.2 Capital adequacy management

In contrast to bank liquidity, solvency is the ability of a bank to repay its obligations ultimately. From the banks' point of view, capital is costly. Hence, there is a trade-off between safety and returns as the higher the capital, the lower the ROE, ceteris paribus. The efficient allocation of capital to be able to generate the best risk-adjusted return is crucial in the profit-maximizing bank (Casu, Girardone & Molyneux; 2015).

4.3.3 Off-balance-sheet (OBS) business

Typically, OBS activities have no asset backing and are often referred to as contingent, meaning that it is dependent on something that may or may not occur. An unused overdraft facility is an example of an OBS activity.

For the bank, the earnings generated from OBS operations are fee-related and so long as the activity is contingent it is not reported on the bank´s balance sheet as there is no asset or liability. OBS business increases fee income without increasing the asset base and banks can use this tool to increase their profitability. However, under the Basel III Capital Accord, banks are required to convert the OBS business into credit or asset equivalents in the calculation of risk-weighted assets (Casu, Girardone & Molyneux; 2015).

4.4 Financial regulation

4.4.1 Systemic (macro-prudential) regulation

Systemic regulation is concerned with the soundness of the financial system and is designed to minimize the risk of bank runs. This is called the safety net and encompasses two main features – deposit insurance and the lender of last resort function (LOLR). Deposit insurance is a guarantee that all or part of the amount deposited by savers in a bank will be paid in the event that a bank fails. The LOLR-function is the provision of funds from the central bank in times when banks are in financial distress and can't access credit through any other channel (Casu, Girardone & Molyneux; 2015).

4.4.2 Prudential (micro-prudential) regulation

Prudential regulation is mainly concerned with consumer protection with particular attention paid to asset quality and capital adequacy.

4.4.3 Rationale

Because of the important role that banks play in our society, the consequences of a bank failure is not treated as any other failing firm and entails a varying degree of intervention by authorities. Regulation can be understood mainly by three factors: The reliance on public confidence to prevent bank runs, the nature of the activities which make them more sensitive than other firms, and the interconnectedness which leads to severe consequences.

The business model of a bank is based on and could not exist without confidence from the public. Banks only keep a small fraction of deposits in cash – to make money, they lend out the majority of deposits to borrowers or use the funds to purchase other interest-bearing assets. If a bank is faced with a sudden increase in withdrawals, which might be triggered by a loss in confidence, it needs to increase its liquidity to meet depositors' demand. Bank reserves are often not sufficient to cover the withdrawals and banks' are forced to sell off their assets. Bank loans are highly illiquid because of the information asymmetries: It is very difficult for a potential buyer to evaluate costumer-specific information on the basis of which the loan was agreed. Hence, the banks may be forced to sell these assets at a loss. The illiquidity problem has effectively turned the bank insolvent if the assets do not cover the liabilities. Due to the interconnectedness of the financial system, the problems spread to other banks and eventually the whole system. The social costs of bank failure are greater than the private costs, and this illustrate the need for regulation.

Consumer protection is particularly important and motivated by the social safety net of a welfare state. The problem related to it arises mainly because of the information asymmetry (Casu, Girardone & Molyneux; 2015).

5 Basel III and CRR/CRD IV

The purpose of this section is to outline the relevant parts of the regulation applied to the Swedish SIFIs. It begins with an outline of the background followed by definitions. Lastly, the risk measures relevant for the financial analysis are outlined.

5.1 Overview

5.1.1 Transforming Basel III to the EU legal framework CRR/CRD IV

The new legislative package consists of a Directive 2013/36/EU, referred to as CRD IV and a Regulation (EU) nr. 575/2013 referred to as CRR. The directive concerns areas where the degree of prescription is lower and where the links with national administrative laws are important. By contrast, the detailed and highly prescriptive provisions on calculating capital requirements take the form of a regulation.

The most fundamental change in the implementation of the Basel III agreement with the EU is the movement from a system where capital is the only prudential reference to a multi-dimensional regulation and supervision including capital, liquidity and the leverage ratio which covers the whole balance sheet of the banks. Also within capital, there is a much clearer definition and more realistic targets (European Commission, 2013).

5.1.2 Developments in Basel regulation

The previous EU bank capital framework is represented by the Capital Requirements Directive (CRD) comprising directives 2006/48/EC and 2006/49/EC and reflecting the proposals of the Basel Committee for the Basel II Framework. The most fundamental change between Basel 1 and 2 is the possibility for the banks to use their own internal methods (The Internal Ratings-Based approach, IRB) to calculate the capital requirements. These calculations resulted in general in reductions in the capital requirements. The financial crisis of 2008 unveiled that the lower capital held posed significant threats of the loss-absorbing capacity of banks as well as a number of other shortcomings of this framework. The G-20 Declaration of 2 April 2009 addressed the crisis with internationally consistent efforts to meet these shortcomings. In December 2010, the Basel Committee issued detailed rules of new global regulatory standards on bank capital adequacy and liquidity that collectively are referred to as Basel III. The Basel Committee on Banking Supervision (BCBS) has the task of developing international minimum standards on bank capital adequacy. The European Commission, the European Banking Authority (EBA) and the European Central bank are observers (European Commission, 2013).

5.1.3 Rationale for CRR/CRD IV

In Europe, the banking sector is much more integrated than in for example the US. EU banks authorized in one member state can provide their services across the EU´s single market and are more likely to engage in cross-border business. Moreover, applying internationally agreed rules only to a subset of European banks might create competitive distortions and potential for regulatory arbitrage. However, transforming regulation into legislation must be done with precaution. To implement a set of internationally agreed standards and

transform it into a single set of prudential rules must go through a process of democratic control. Moreover, it needs to fit with existing EU- and national laws and arrangements (European Commission, 2013).

5.1.4 The single rule book

The regulation is "a single rule book" which means that a single set of prudential rules is applied to all banks in EU. It is supposed to close the regulatory loopholes that the banks exploited and which in turn caused the financial crisis of 2008.

Application of the new legislative package was initially supposed to begin in 2013. However, the implementation was delayed and began at 1st of January 2014 with full implementation on 1st of January 2019. The capital instruments are to be phased in gradually during this transition period to help ensure that institutions do not cut back on lending and investments. However, the CRR allows member states to implement the stricter definition and/or level of capital more quickly than is required by Basel III. The Member States also has the possibility to require their institutions to hold more capital.

In late 2011, The Swedish Financial Supervisory Authority and the Swedish Central Bank decided that Sweden should be one of the first countries to implement higher capital requirements as well as conduct a more rapid implementation for their largest banks than is proposed by the Basel III (European Commission, 2013).

5.1.5 Supervision of Swedish banks

The Swedish Financial Supervisory Authority (Finansinspektionen) and the Swedish Central Bank (Riksbanken) have the main responsibility of monitoring the compliance of the banks. The two organs are together promoting stability in the financial system.

The Swedish Financial Supervisory Authority is supervising the individual institutions and their operations in the financial markets. The Swedish Financial Supervisory Authority issues detailed regulation on framework legislation passed on by the Swedish parliament.

The Swedish Central Bank has the overall responsibility to promote the functioning of the financial system. The main task is to maintain price stability. Another important task is to promote a safe and efficient payment system which in turn secures the stability in the financial system (Swedish Bankers' Association, 2014).

5.2 Definitions

The definitions are retrieved from the Memo by the European Commission (2013).

5.2.1 Pillar 1

The risk in Pillar 1 is what the regulatory capital calculations are based on. The risk types that create the capital requirements are credit risk, market risk and operational risk.

5.2.2 Pillar 2

Pillar 2 refers to additional risks not included in Pillar 1 and refers to for example liquidity risk, business risk, and concentration risk. Pillar 2 risks are not included in the capital requirements calculations or binding at a multinational level. A national and international supervisory review evaluates the process and assesses how institutions are complying with EU banking law.

5.2.3 Pillar 3

Pillar 3 is a set of disclosure requirements and is transmitted to the Basel III from the Basel II regulation. The purpose is to establish a common and consistent set of reporting requirements for capital risk exposures, risk assessment processes and the capital adequacy. Disclosure that is based on a common framework ensures comparability.

All four Swedish SIFIs are subject to the disclosure requirements under Pillar 3 of Basel III. For year 2010 – 2013, the risk management and capital adequacy reports are based on Basel II regulations through the Swedish financial Supervisory Authority´s regulations FFFS 2007:5. Year 2014 is based on FFFS 2014:12 which in turn is based on Basel III and regulated in Regulation (EU) No 575/2013 (below CRR) and Directive 2013/36/EU (Below CRD IV).

5.2.4 Systemically important banks

The Basel III regulation will affect all banks however the impact may differ across banks type and size. The largest and most important institutions will have to cope with higher capital requirements or be subject to additional supervision. Global Systemically Important Financial Institutions (G-SIFIs) are used to define banks or financial institutions that are deemed too big to fail on a global basis. The FSB and BCBS identify the group of G-SIFIs and publish the list each November (Casu, Girardone & Molyneux, 2015). In Sweden, Nordea is G-SIFI while Swedbank, SHB, SEB and Nordea are considered domestically too important to fail (D-SIFI) (European Commission, 2013).

5.2.5 Risk-weighted assets (RWA)

In the CRR, the own funds requirement refers to the amount of capital an institution must hold compared to the amount of assets it holds to be able to absorb unexpected losses. The assets are risk-weighted in accordance to the risk they impose. Safe assets, as cash or most government bonds, are considered as riskless

while for example loans to other institutions or mortgage loans are considered more risky and get a higher weight. In effect, the more risky assets an institution holds the more capital it requires.

5.3 Risk measures

Due to the delimitation of the thesis, the author has decided to not consider all the elements of the extensive legislative package. Based on the problem statement, the author considers the implementation in Sweden and the focus is on the following areas:

- Minimum capital requirements
- Capital buffers
- Liquidity
- Additional Swedish requirements

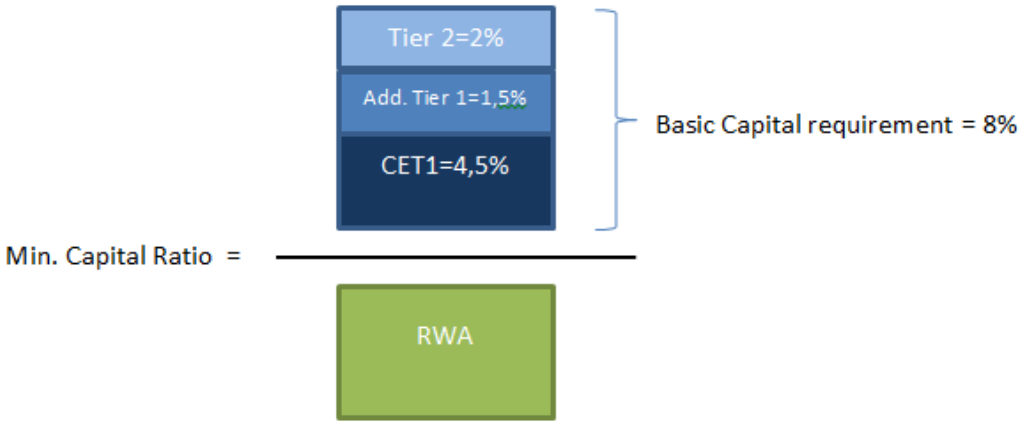
The risk measures are defined in the Memo by the European Commission (2013).

5.3.1 Minimum Capital Requirements

For the purpose of prudential requirements for banks, accounting capital is separated from regulatory capital. Only capital that is at all times freely available to absorb losses qualifies as regulatory capital and is therefore more conservative than accounting capital. This also means that the capital needs to be adjusted by deducting assets that may not be stable during stressed market circumstances, e.g. goodwill or not realized gains.

The total capital ratio is defined as capital / RWA.

Figure 1: Minimum capital requirement 31/12/2014



Source: Conducted by author.

5.3.1.1 Tier 1 capital

The CRR requires an increase in Tier 1 capital ratio from 4% to 6%.

5.3.1.1.1 Tier 1 Common equity (CET1)

The CET1 is the purest form of capital and it consists of retained earnings and common equity. In the CRR, the share of the Tier 1 capital requirement of 6%, the CET1 has to be 4,5% (from previous 2%) by 1st of January 2014. There are 12 strict criteria stated in Article 28 of the CRR which much be met for a capital instrument to be classified as Common Equity Tier 1 instruments. Please see appendix 1.

5.3.1.2 Tier 2 capital

Tier 2 capital ensures that depositors and senior creditors can be repaid if the institution fails and sits on top of the Pillar 1 capital. This category includes hybrid capital and subordinated debt and needs to be 2%.

5.3.2 Capital Buffers

In addition to the changes in the minimum capital requirements, the rules in Basel III introduce three new capital buffers. The buffers are defined as a percentage of the total RWA.

5.3.2.1 The capital conservation buffer

Institutions need to meet a 2,5% buffer with an additional amount of CET1. The objective is to conserve a bank's capital and limit erosion. When the CET1 capital ratio falls below 7%, automatic safeguards kicks in and limit the amount of dividend and bonus payments a bank can make. The buffer prevents the banks' capital to be further eroded by such payments.

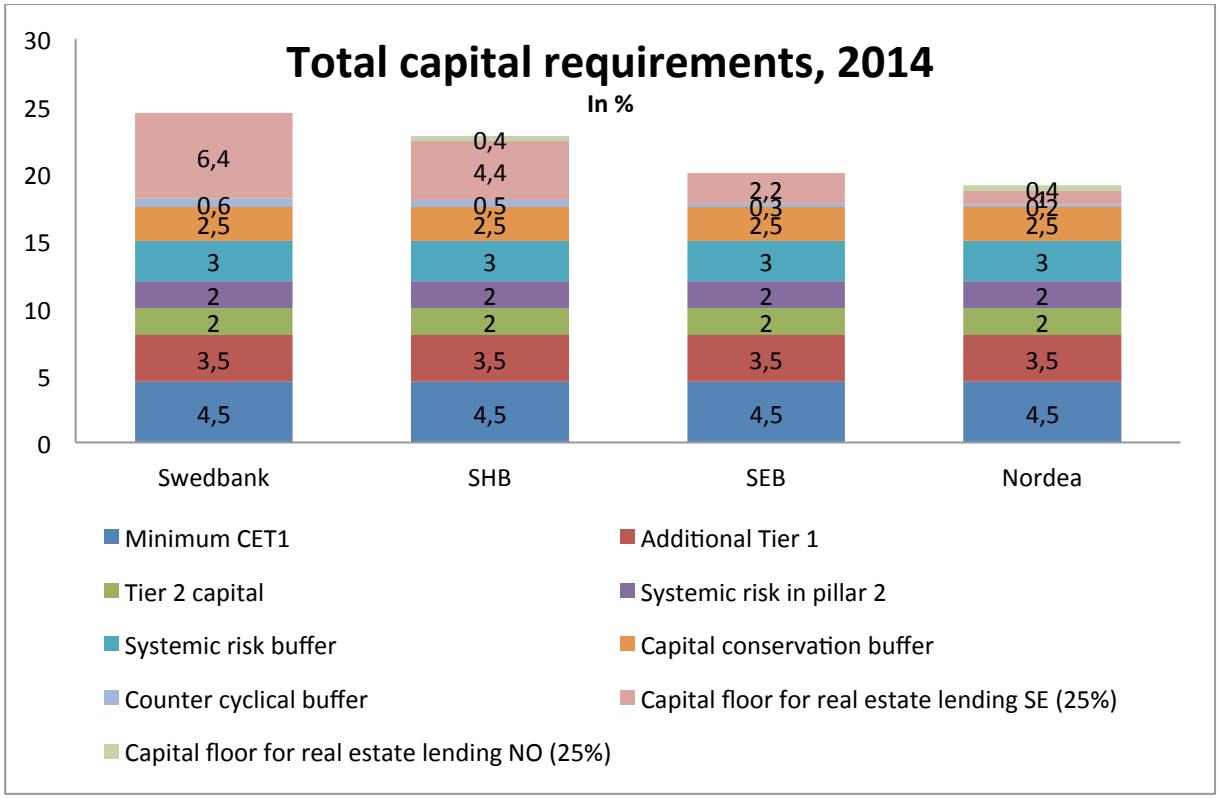
5.3.2.2 The counter-cyclical buffer

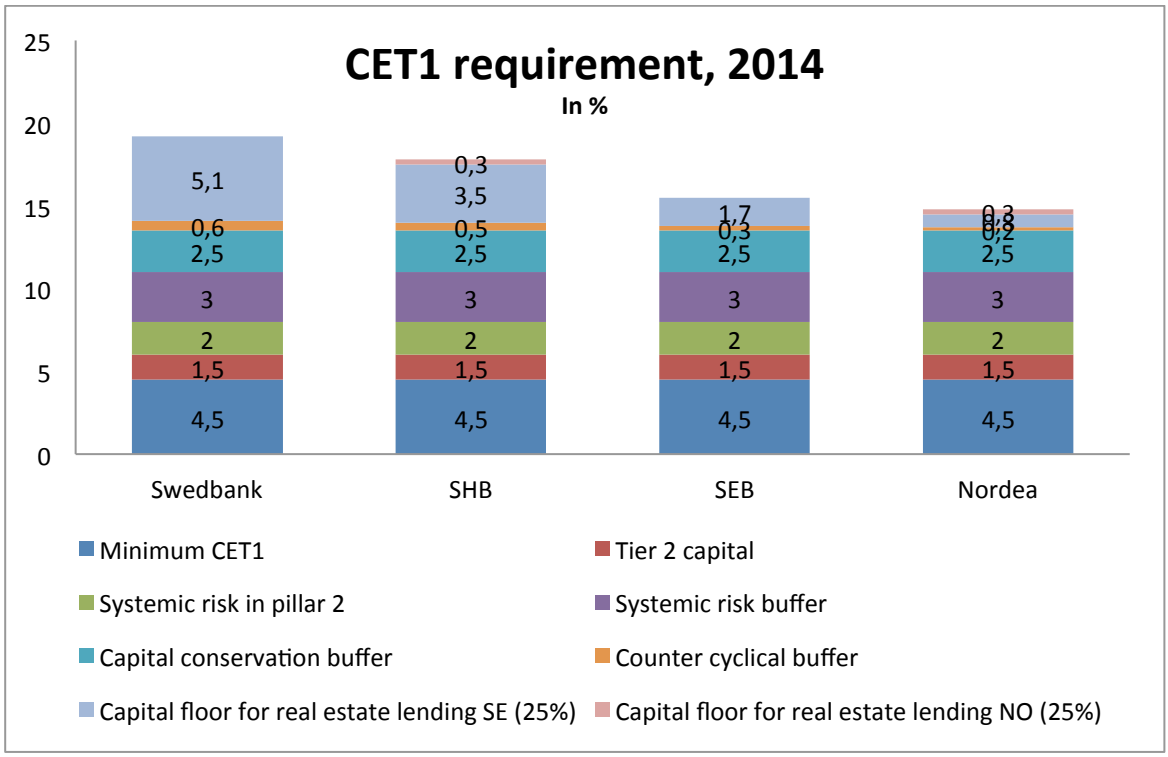
The counter-cyclical buffer is meant to counteract the effects of the economic cycle on banks' lending activity. During good economic conditions when credit growth is strong, it requires banks' to have an additional amount of CET1. In this way, it prevents that credit becomes too cheap and may reduce the probability of credit bubbles. In the same way, it prevents credit crunches through allowing the buffer to be released during economic downturn. The CRR sets the buffer to vary between 0 and 2,5%. In 2014, the buffers for the Swedish SIFIs were between 0,3% and 0,9%.

5.3.2.3 The systemic risk buffer

The systemic risk buffer may be introduced by each member state in order to prevent and mitigate long term non-cyclical systematic or macro-prudential risks. In 2014, Sweden has implemented a systemic risk buffer of 3%.

Figure 2: Total capital requirements & CET1 requirements, 2014





Source: Conducted by author. Data retrieved from Finansinspektionen (2014a).

5.3.3 Liquidity

This section is based on the Memo by the European Commission (2014).

Basel III introduced two new ratios to address the problems that stemmed from insufficient liquidity during the financial crisis, The Liquidity Coverage Requirement (LCR) and The Net Stable Funding Requirement (NSFR). The legislation for NSFR will not be ready for implementation until the end of 2016 so the author only considers the LCR-ratio.

5.3.3.1 Liquidity Coverage Requirement (LCR)

The LCR is designed to ensure that sufficient high-quality assets are available for one-month survival in case of a stress scenario. To mitigate the possible negative impact on the real economy stemming from the shift from loan assets to more liquid assets in a time of economic difficulty, the phasing-in of the LCR should occur slowly. However, each member state is allowed to introduce the LCR more rapidly.

The Swedish Financial Authority has decided that the largest and most important Swedish financial institutions should act ahead of the requirements regarding LCR constituted in the Basel III requirements. This regards financial institutions with total assets over 100b SEK. The binding requirements were proposed in FFFS 2012:5

and came into force in 2013 and are defined in a slightly different manner than in the Basel III: A bank's weighted liquid assets must cover the banks weighted net outflow over a 30-day period of market stress. The requirement applies to LCR at aggregate level as well as separately for US dollars and euros. It is important to note that this requirement do not create capital requirements and the regulation is not reflected in the exposure (Finansinspektionen, 2012).

Equation 4: LCR

$$LCR = \frac{Liquidity\ buffer\ (Stock\ of\ HQLA)}{Total\ stressed\ net\ outflows\ over\ the\ next\ 30\ calender\ days} \geq 100\%$$

Source: Conducted by author.

5.3.3.1.1 High Quality Liquid Assets (HQLA)

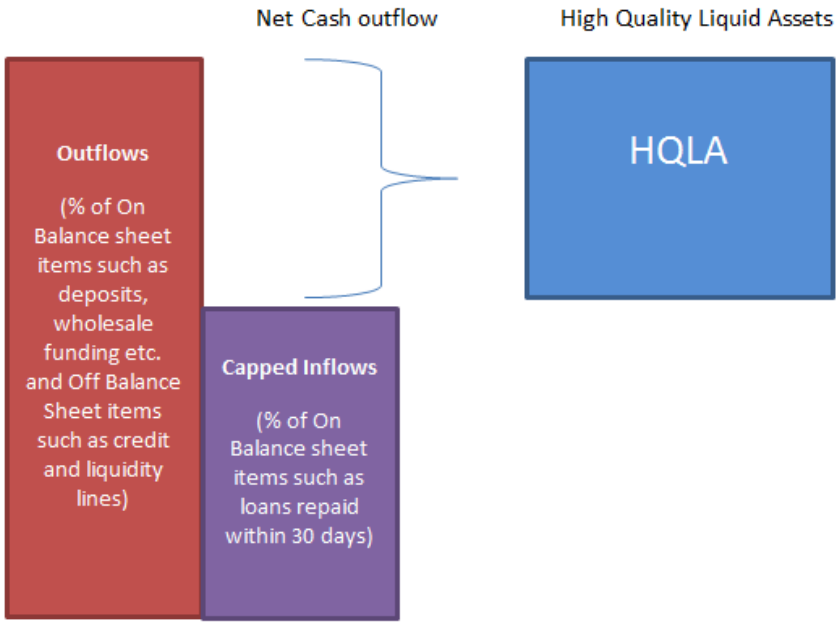
HQLA is defined as assets that can be sold in private markets with no or little loss of value even in stressed situations. The HQLAs are divided into three different categories dependent on their level of liquidity. There are caps as well as discounts applicable to the different categories designed to reduce concentration risk. The discounts provide an additional level of conservatism which protects against potential losses in the value of liquid assets when sold in stressed conditions.

5.3.3.1.2 Cash outflows and -inflows

Outflows are calculated as a percentage outflow of on-balance sheet items such as funding (e.g. deposits and wholesale funding) received by banks and off-balance sheet commitments (e.g. credit and liquidity lines) made by banks. The outflow varies substantially by counterparty. The outflow expected on retail deposits is for example lower than for big corporates and especially financial institutions.

Inflows are calculated as a percentage inflow of on-balance sheet items and generally consist of inflow on retail, corporate and financial loans what will be repaid within 30 days and cash from funding returning to the bank on maturing repo contracts.

Figure 3: LCR



Source: Conducted by author.

5.3.4 Other regulation

In addition to capital and liquidity, the following requirements apply for Swedish banks.

5.3.4.1 Capital floor for real estate lending in Pillar 2

For exposures in Swedish and Norwegian real estate, the Swedish and Norwegian financial authorities decided that the average risk weight for these types of exposure should be minimum 25%. In the calculation of the capital requirements that this floor result in, all capital requirements in pillar 1 should be included, also the contra-cyclical buffer for Sweden. This results in differing requirements between the banks as well as the coverage by CET1 and additional capital.

5.3.4.2 Basel 1 floor

The 8 largest banks in Sweden have permission to use internal (IRB) models and are therefore affected by the Basel 1 capital floor. Banks using the IRB approach shall, at all times, hold own funds which equal or exceed 80% of the total minimum amount of own funds that the institution would be required to hold under Basel 1 rules. Hence, the Basel 1 floor is a parallel security barrier (Swedbank, 2014). Although the CRR offers the possibility for member states to remove the Basel 1 floor-regulations, the Swedish Financial authority has

decided to maintain it. The capital buffers implemented in the CRR increases the capital requirements to levels above what is required according to the Basel 1 floor. As a result, the Basel 1 floor is "absorbed" by the capital buffers and is working only as a parallel security barrier and is in practice never enforced (Finansinspektionen, 2013).

5.3.4.3 Financial stability measures

The Swedish National Debt Office (Riksgälden) is responsible for the support measures that are supposed to protect financial stability. During the financial crisis of 2008, the authorities created different measures like for example loan guarantees, capital infusions and emergency support.

The stability fund was established to support the financial system during distressed times. The Swedish government initially provided SEK 15 billion to the fund and banks are supposed to contribute with annual fees until 2023. In October 2014, the fund was SEK 53 billion.

The Swedish government compensates losses through the deposit insurance up to 100,000 euro per costumer and institution.

6 Risk

The purpose of this section is to give the readers a common understanding of how risk should be understood in relation to the CRR/CRD IV. It explains the risk which is specific for financial institutions and how the capital requirements are calculated. It derives what the different risk categories stems from, how it is measured and how it is managed.

6.1 Risk exposure calculations

Risk measurement in relation to capital requirements is concerned with the quantification of risk exposures and it can be divided into credit risk, market risk and operational risk. The ultimate measurement on which the capital requirements are calculated is the Risk Weighted Assets (RWA). It can also be referred to as the Risk Exposure Amount (REA). The terms will be used interchangeably.

The REA is calculated in different manners for the three risk categories. However, they all result in the same measurement which is REA. The total REA is multiplied with the relevant capital requirement ratio to obtain the minimum capital requirement.

Equation 5: Minimum capital requirements

$$Minimum\ Capital\ requirements = REA \times 8\%$$

6.1.2 Credit risk

Credit risk is the risk of a decline in the credit standing of a counterparty. Banks face credit risk mainly from the traditional lending activity but it can also be derived from securities such as bonds and other financial instruments such as derivatives. Capital markets value the credit standing of firms through the rate of interest charged on bonds or other debt issues, changes in the values of shares and ratings provided by credit-rating agencies. In normal times, non-performing loans (loans that are not repaid) are the most frequent cause of bank losses (Casu, Girardone & Molyneux; 2015).

6.1.2.1 Credit risk management

The financial theory regarding risk and return applies, implying that holding assets with higher risk gives higher returns. Therefore, bank managers minimize credit losses by building a portfolio of assets (loans and securities) that diversifies the degree of unsystematic or firm-specific risk. However, as derived in the finance theory section, the quantitative measurement of the impact of diversification remains a modelling challenge. This type of diversifiable risk is derived from micro-factors, whilst the banks remain exposed to systematic credit risk. Systematic credit risk is associated with macro-factors and the event connected to the possibility that the default of all firms may increase. For financial institutions, this also affects the systemic risk.

6.1.2.2 Credit risk measurements

There are three factors that drive expected and unexpected losses on a credit portfolio.

6.1.2.2.1 Probability of default (PD)

Costumer default risk is determined by the risk-grade profile of the portfolio, and may be appraised through both internal and external credit ratings and historical data on defaults. The Swedish SIFIs base their PD calculations on the historical percentage of defaults for different types of exposure. The average default is then adjusted by a margin of conservatism and a business cycle adjustment factor. The margin is intended to ensure

that the long-term probability of default is not underestimated. According to the CRR, a default has occurred if the payment from a counterparty is 90 days late.

6.1.2.2.2 Exposure at default (EAD)

Exposure at default is the amount that is likely to be outstanding at the time of default. The EAD in the annual reports is normally defined as the booked, or market value. For off-balance sheet items, a Credit Conversion Factor (CCF) is multiplied with the amount to estimate how much of the exposure will be drawn at default. These factors are normally determined by the regulatory code but banks can also use their own calculated conversion factor for some exposures.

The calculation of EAD under the internal method implies that historical losses have a direct impact on risk calculations and capital requirements. The calculation of EAD under the standardized approach does not take account of credit risk mitigation techniques and therefore equals the nominal amount of the exposure for on-balance sheet items. The banks are also required to account for the risk concentrations in industrial and geographic sectors as well as large individual exposures. This assures that concentration risk and risk due to large exposures is accounted for and reflected in the EAD.

6.1.2.2.3 Loss given default (LGD)

The LGD is the value of EAD which is lost in case of default. Loss given default may depend upon guarantees, either from third parties or from any posted collateral, recovery after bankruptcy and the liquidation of assets. In the Pillar 3 reports, it says that the Swedish SIFIs set the LGD-measures conservatively to reflect the conditions in a severe economic downturn.

6.1.2.2.4 REA calculations for credit risk

The EAD is multiplied with a Risk Weight (RW) that reflects the underlying risk and the banks arrive at the REA.

Equation 6: REA

$$REA = EAD \times \overline{RW}$$

Where

REA = Risk weighted exposure amount.

EAD = Exposure at default

6.1.2.2.5 The IRB-approach

The Swedish SIFIs have permission from the Swedish Financial Supervisory Authority to calculate the majority of the capital requirement for credit risk using the IRB approach. This applies for all years relevant for the analysis (2010-2014).

Under the IRB-approach, the banks are allowed to use a broader set of parameters to determine the REA. However, all four banks base their calculations on the risk parameters PD, EAD and LGD.

The IRB-model works as follows: Internal statistical models calculate the historic risk of default (PD) for different asset classes. The risk is determined by historical data and depends on a range of factors. Similarly, LGD and CCF are calculated based on historical data. The assets are assigned different risk classes depending on the PD-value.

Risk mitigating factors such as collateral or derivatives are eligible to reduce REA and hence the capital requirements. For the collateral items and guarantees to be defined as eligible, the collateral management process and the terms in the collateral agreements have to fulfil minimum requirements stipulated in the capital adequacy regulations.

6.1.2.2.5.1 Exposure classes under the IRB-approach

Exposures to states, central banks, government agencies and municipalities are classed as sovereign exposures. Exposures to institutions refer to exposures to counterparties defined as banks and other credit institutions and certain investment firms.

For SHB, retail exposures consists of private individuals with exposure not exceeding SEK 5m and legal entities with a maximum turnover of SEK 50m. Also this exposure is max SEK 5m. For Swedbank, this category is valid for up to SEK 6m. For Nordea, retail exposures are defined as exposures to private individuals and SMEs less than EUR 250k.

Corporate exposures refers to exposures that do not fall into any of the other exposure classes and therefore mainly refers to non-financial companies.

6.1.2.2.6 The standardized approach

The standardized approach is the least sophisticated of the two capital calculation approaches and does in general calculate higher REA and hence higher capital requirements. The risk weights and the CCF for off-

balance sheet calculations are set by the supervisory authorities and are based on external rating and assigned different exposure classes. It is used for the part of the credit portfolio that is not eligible to be calculated by the IRB approach.

6.1.2.2.6.1 Exposure classes under the standardized approach

Exposure to central governments and central banks is treated as risk-free if the counterparty is within the European Economic area and has a high rating. Regional governments and local authorities' exposures are treated in the same way as the exposure to central banks.

Exposure to institutions should be assigned a risk weight according to an external rating from eligible credit assessment agencies. Where external rating is missing, specific rules apply. Risk weights can differ from 0% to 150% for this exposure class.

Exposure to corporates rated by a credit assessment agency should be assigned a risk weight between 20% and 150%. Exposure without external rating is assigned a risk weight of 100%.

Retail exposure is assigned a risk weight of 75%.

Exposure secured by real estate is assigned a risk weight of 35%. The risk weight is only reduced for the part of the exposure that is fully secured.

Additional exposure classes in the standardized approach are for example exposure to multilateral development banks, past due items and short-term claims.

6.1.3 Market risk

Market risk is also called trading risk and relates to changes in prices and volatility in the financial markets which can lead to future losses. It can be divided into interest rate risk, currency risk, equity risk and commodity risk. The author will only consider interest rate risk and currency risk due to the scope of the thesis.

It is common to refer to market risks in the trading book and the banking book. The trading book includes the contracts the bank enters into as part of its trading operations. According to Basel II and III, the trading book has to be valued at a daily marked to market basis. The market risk in the banking book refers to the risks associated with the traditional lending activities where assets are held to maturity (Casu, Girardone & Molyneux; 2015).

6.1.3.1 Market risk measurement

As no measurement method can cover all market risks at all times, banks use several methods to measure market risk. Some examples are scenario- and sensitivity analysis, back-testing and stress testing.

The market risk is also calculated according to a standardized and an internal method. The internal method is based on an internal Value at Risk (VaR)-model. Swedbank, SEB and Nordea use both the standardized and the internal VaR approach to calculate the capital requirements for market risk. SHB only uses the standardized approach.

6.1.3.1.1 VaR-method

VaR-analysis is a method that large banks use to assess the risk of losses in their portfolios of trading assets. It uses statistical analysis of historical market trends and volatilities to estimate the likely or expected maximum loss on a bank´s portfolio or line of business over a period with a given probability. The model builds on portfolio theory and it uses the volatility of assets to express the maximum amount a bank might lose, to a certain level of confidence as a result of changes in risk factors (Casu, Girardone & Molyneux; 2015). VaR is a useful tool for comparing risk levels across different asset classes such as interest rate, foreign exchange or equity, and thus gives insight into each asset class as well as into their relative risk levels (Swedbank, 2014).

6.1.3.1.1.1 Stressed VaR

During the financial crisis, observed losses in banks' trading books were significantly higher than the minimum capital requirements under the Pillar 1 market risk rules. To address this problem, BCBS introduced a stressed VaR. This measure took a one-year observation period relating to significant losses into account. The amendments to the CRD 3 (2010/76/EU) relating to the Stressed VaR in the trading book is a direct transposition of this (EBA, 2012).

Due to banks' different approaches in calculating VaR numbers, careful considerations must be taken when comparing the numbers.

6.1.3.2 Interest rate risk

6.1.3.2.1 Risk management for interest rate risk in the banking book

A key risk management activity for the lending activity is the management of net interest income which stems from the mismatch of interest-rate fixing periods between lending and funding (Hull 2012). This is called repricing risk. Traditional interest rate risk analysis compares the sensitivity of interest income to changes in

asset yields with the sensitivity of interest expenses to changes in interest costs of liabilities. It is common to refer to the ratio of rate-sensitive assets to rate-sensitive liabilities, implying that if a bank has a ratio above 1.0, the banks returns will be lower if interest rates decline and higher if they increase. One way a bank can minimize the interest rate risk is to ensure that maturities of the assets and liabilities match. Today, banks use sophisticated systems for the monitoring by maturities so that they can fine-tune the offered rates. They can also use derivatives such as interest rate swaps to manage exposure. The result of these methods is that the banks are able to hold a very stable interest margin which does not lead to significant risks (Hull, 2012). When attempting to measure and manage interest rate risk, it is important to note that the exposure to such risk concerns future losses (or gains) and therefore, some uncertainty may always be present (Casu, Girardone & Molyneux; 2015).

6.1.3.3 Currency risk

Currency- or foreign exchange risk is the risk that exchange rate fluctuations affect the value of a bank´s assets, liabilities and off-balance sheet activities denominated in foreign currency. The exchange rate is a price and is determined by supply and demand and expressed in for example spot rates and forward rates. To measure foreign exchange risk, banks calculate measures of net exposure by each currency (Casu, Girardone & Molyneux; 2015)

6.1.3.3.1 Foreign exchange risk management

A bank may be willing to take advantage of differing interest rates or margins in another country or simply invest abroad in a currency different from the domestic one.

6.2 Other risk measurements

6.2.1 Liquidity risk

A liquid asset can be defined as an asset that can be turned into cash quickly without capital loss. Most banks deposits are liquid, but the assets they are funding, such as property, are highly illiquid. Liquidity pressure can arise from both sides of its balance sheet. On the liability side, unexpectedly high cash withdrawals can cause solvent banks to experience liquidity problems. On the asset side, liquidity problems can be caused by unexpectedly high loan defaults and costumers unexpectedly drawing down lines of credit. Liquidity problems may make it difficult for banks to borrow money in the interbank market. Eventually, without intervention from a central bank, a liquidity crisis can turn the bank insolvent (Casu, Girardone & Molyneux; 2015).

6.2.1.1 Liquidity risk measurement

There are several indicators of liquidity risk. For example, the amount a bank has in purchased or volatile funds and the amount the bank has used of its potential borrowing reserve. Another measurement, which is also implemented according to the Basel III and FFFS 2012:6 for Swedish banks is the Liquidity Coverage Ratio (LCR).

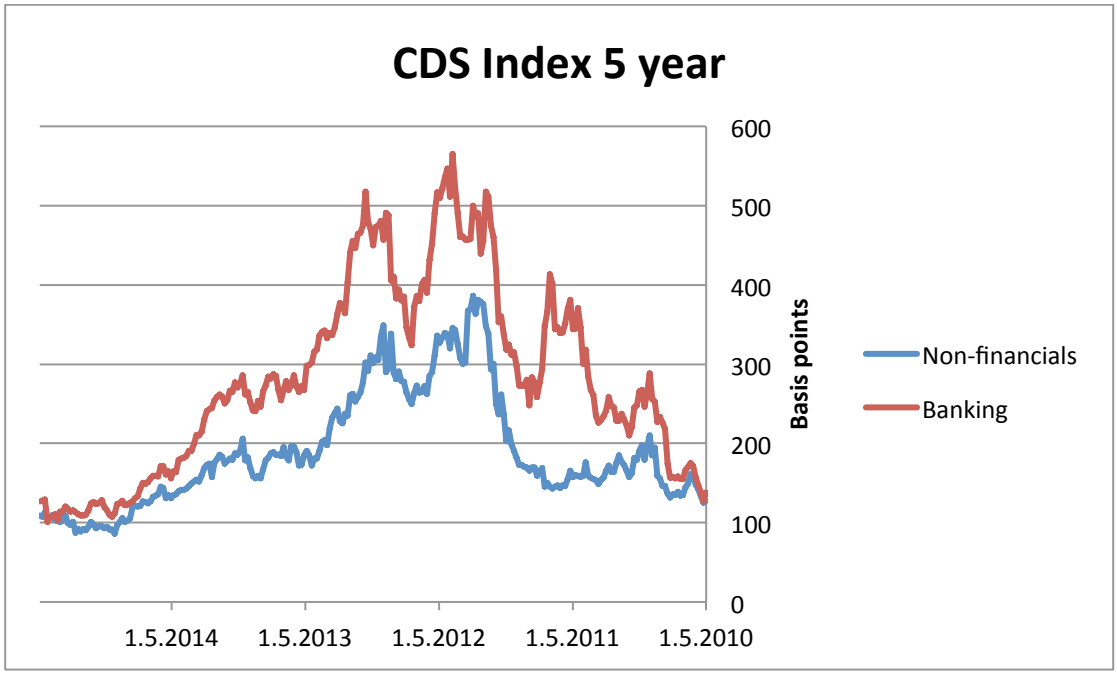
6.2.1.2 Liquidity risk management

A bank can reduce its liquidity risk by holding more liquid assets or to reduce the net outflows. As liquid assets tend to yield lower returns, there is a trade-off between liquidity and profitability.

6.3 Credit default swaps

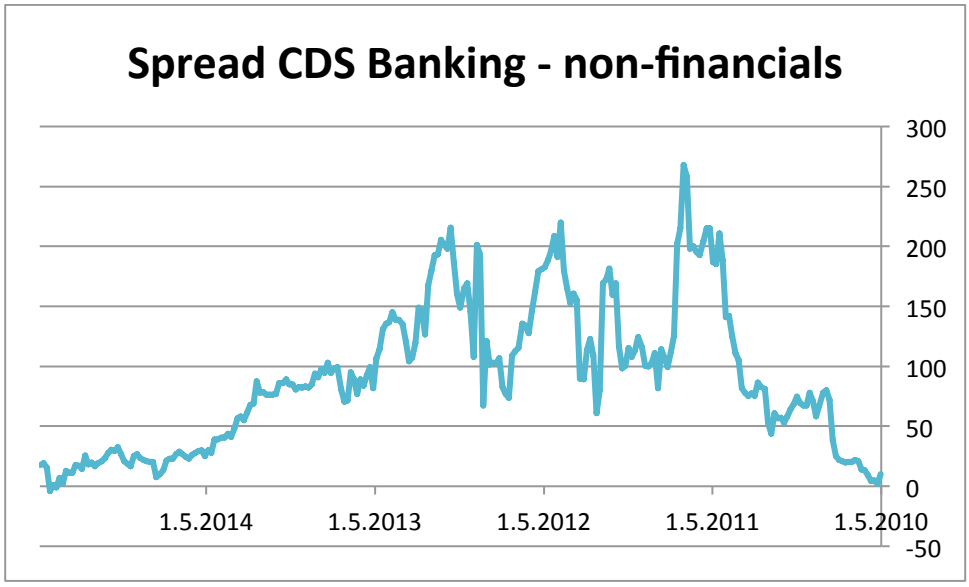
A credit default swap (CDS) is the most widely traded credit derivative instrument. A CDS is an insurance against the risk of default by a reference entity and consists of three parties; a protection buyer, a protection seller and a reference entity. The protection buyer makes periodic payments to the seller until the maturity date of the CDS contract or when a credit event occurs, whenever comes first. The protection seller is obliged to buy the reference bond at its par value when a credit event occurs. A credit event can be bankruptcy, obligation acceleration, obligation default, failure to pay, repudiation, moratorium or restructuring. The periodic payment is usually expressed as a percentage (in basis points) of its notional value and is called the CDS spread or premium. This CDS spread represents an alternative market price of the credit risk of the reference entity in addition to its corporate bond yield from the cash market (Zhu, 2004). The CDS spread is considered to be a superior measure of credit risk to bond spreads (see Longstaff et al. (2005) and Blanco et al. (2005), for example). Hence, the CDS-spread is an indication of how the market perceives risk for institutions.

Figure 4: CDS Index European banking and European non-financials



Source: Data retrieved from Datastream. See appendix 2.

Figure 5: Spread CDS European banking – non financials



Source: Data retrieved from Datastream.

The non-financials CDS spread consists of an equally weighted average of the following European CDS-indexes: Consumer goods, manufacturing, electric power, Services, telecom, energy, sovereign & transport.

The first figure shows that both the absolute level and the relative value of the risk is lower for financial institutions than the general market in 2014. The second figure is the difference between the two spreads. What is noteworthy from this spread is the relatively large increase in the risk for financials which started in late 2010 and continued to early 2011.

7 Macro-economic analysis

The purpose of the macro-economic analysis is to be able to account for macro-economic factors that might have affected the risk of the Swedish SIFIs. The goal is to be able to identify the effects that are due to macro-economic developments and responses in monetary policy. The analysis starts with an explanation of how the financial crisis affected Europe and Sweden, followed by an analysis of macro-economic developments and responses in monetary policy. Lastly, future risk factors for Swedish economy are outlined.

7.1 Macro-economic indicators

One of the main challenges of assessing how macro-economic factors affect the risk parameters in the financial analysis is the extent of and the lag in time between developments in macro-economic factors and the effects on the real economy. According to Manuele (2013) a leading indicator is an economic factor which changes before the economy starts to follow a particular pattern or trend. Examples of leading indicators are the housing market and stock prices. A lagging indicator is a measure that changes after the economy has changed. Examples include the GDP, inflation and interest rates.

7.1.1 Interest rates

There are many different interest rates in one currency. The different interest rates tend to move together but are not perfectly correlated and this makes it complicated to manage the risk associated with it.

7.1.1.1 Overnight rate or the federal funds rate

The overnight rate is defined as the interest rate the central bank charges a financial institution to borrow money overnight and is the most important policy rate. This is the lowest available rate and is therefore only

available to the most creditworthy institutions. The four Swedish SIFIs can all borrow money at this rate. Because of the large fluctuations in banks´ operations during a day, a bank may experience surplus or shortage of cash at the end of the business day. In the US this rate is called the federal funds rate. In Sweden, this is called the Repo lending rate. This is always 0,75 basis points above the repo middle rate (Sveriges Riksbank, 2016). The federal funds rate is the Central Bank's most powerful tool when controlling the short-term interest rates for consumers.

7.1.1.2 Interbank rate

The interbank rate is the rate which banks lend money to one another for different maturities. A key interest rate is the London interbank offered rate (LIBOR). In Sweden, this is called the Stockholm Interbank Offered Rate (STIBOR). When banks lend money at floating rates to corporations, retail customers or even to governments, the rates are reset to the interbank rates periodically. A bank must have a certain creditworthiness to receive interbank loans, typically AA credit rating (Hull, 2012). Just as the overnight lending, the interbank lending ensures liquidity and that the financial market functions properly. The risk premiums applicable to the interbank rate is an indicator of credit risk for financial institutions (Financial Times, 2016).

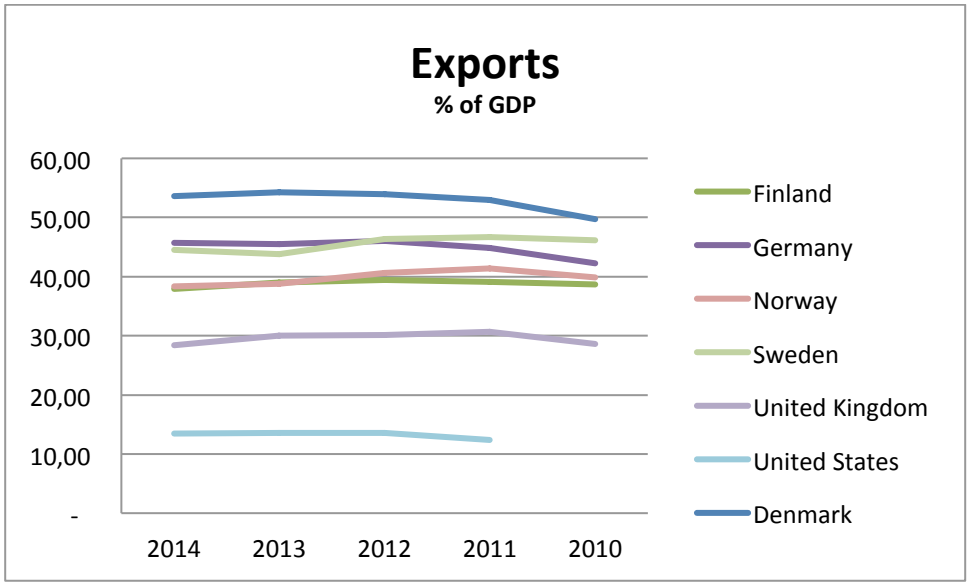
7.2 Developments

7.2.1 2008-2010

The EU banking industry experienced losses due to significant write-downs when the price of mortgage-backed securities collapsed during the financial crisis. However, Eurozone banks, with a few exceptions, were not immediately impacted by the bursting of the US real estate bubble. On average, credit losses of euro area banks generally remained low in 2008. Nevertheless, large European banks with substantial cross-border activities (SIFIs) encountered persistent funding problems, which led to large write-downs on securities and reliance on public support (Casu, Girardone & Molyneux; 2015).

The financial crisis hit Sweden mainly through the macro-economic channel. The cause was mainly driven by the falling export demand as Sweden's exports accounts for a large fraction of the GDP.

Figure 6: Exports as a percentage of GDP



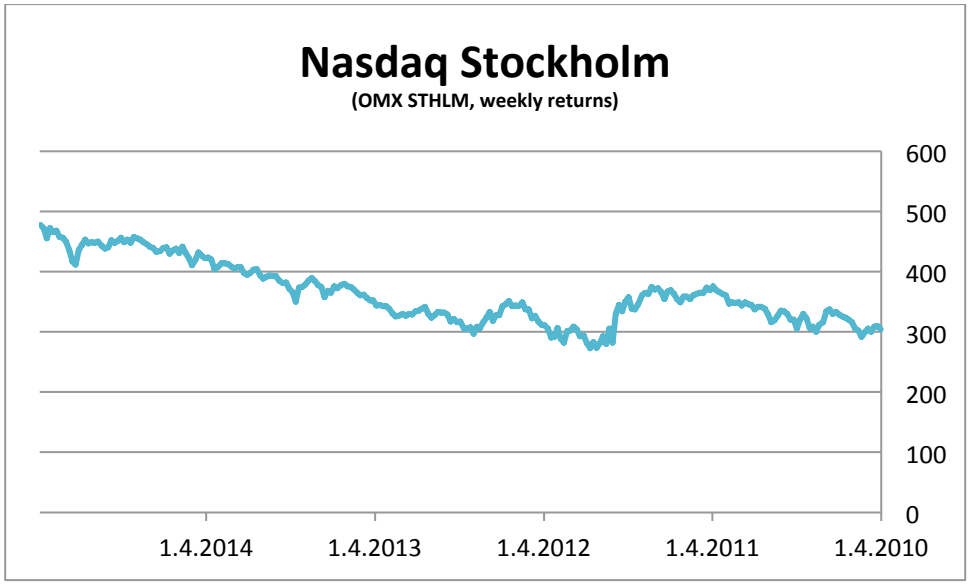
Source: World Bank (2016).

Under normal circumstances, the Central Bank uses the federal funds rate, or the repo-rate, as a monetary policy tool to mitigate the negative effects on the real economy. As a large part of the banks' funding costs is tied to the repo-rate, a lower rate should decrease the interbank lending rates. The lower funding cost provided by the Central Bank is in effect compensating for the increased risk premiums so that the banks can keep up lending to boost the real economy. This is referred to as the transmission mechanism of monetary policy. However, during the distressed time of late 2008, the increased risk premiums that were driven by the low confidence in the functioning of the financial markets made the transmission mechanism to function poorly. The GDP-growth continued to fall and the repo-rate was approaching negative values. The Swedish Central bank therefore decided to take extraordinary measures to further tighten the gap between bank lending rates and the rates that the banks depend on for funding. Starting in late 2008, the banks were offered in total a SEK 295,5b loan with fixed low interest with a 12 month maturity. At the most, these loans made up for 9% of the Swedish GDP. The strategy was supposed to yield positive effects in terms of liquidity and confidence in the financial markets. The analysis made by Elmér et al. (2012) showed that the strategy was successful. Because of the flooding of liquidity in the short-term market, the interbank lending rates decreased as the banks no longer had to borrow money from each other and hence the money market rates, bond rates and floating mortgage rates became lower (Elmér, et al., 2012).

7.2.2 2010-2014

In 2009, the Swedish Central bank began to increase the rates and shorten the maturities for the floating rates that were still offered in addition to the fixed rates. In October 2010, the Central Bank exited the strategy when the last fixed interest rate loans were due.

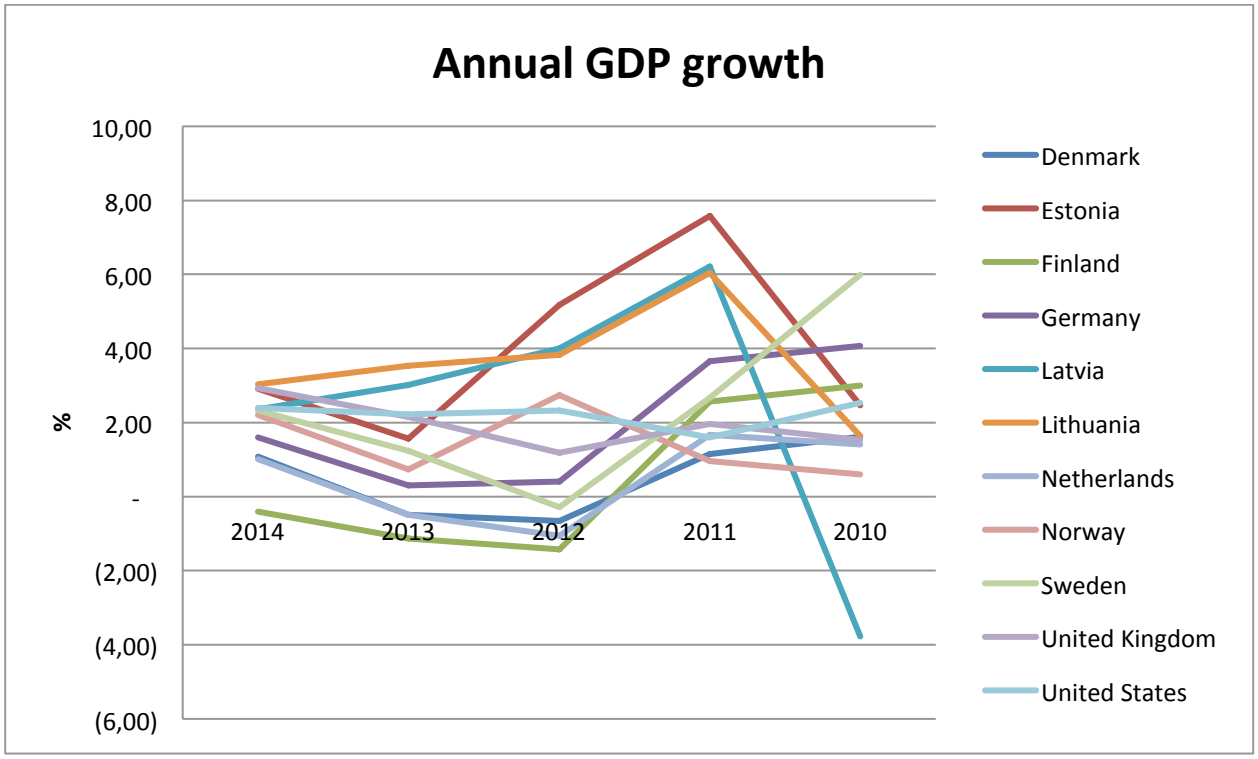
Figure 7: Nasdaq Stockholm



Source: Data retrieved from Datastream.

In 2010, the Swedish economy performed well compared to other countries. However, the stock index in Stockholm began to fall shortly after the Central bank exited the strategy with the fixed rate loans and the developments in the GDP-growth followed.

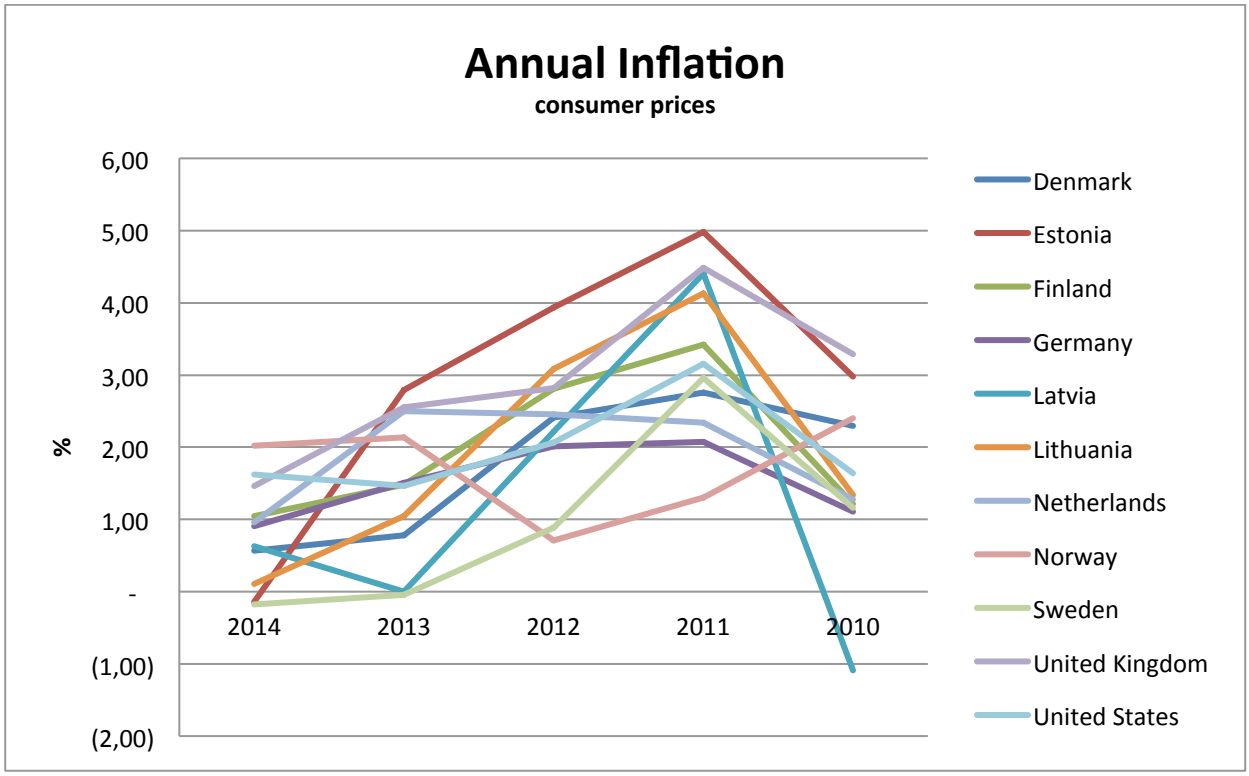
Figure 8: Annual GDP-growth



Source: World Bank (2016).

*The numbers are the annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Figure 9: Annual inflation

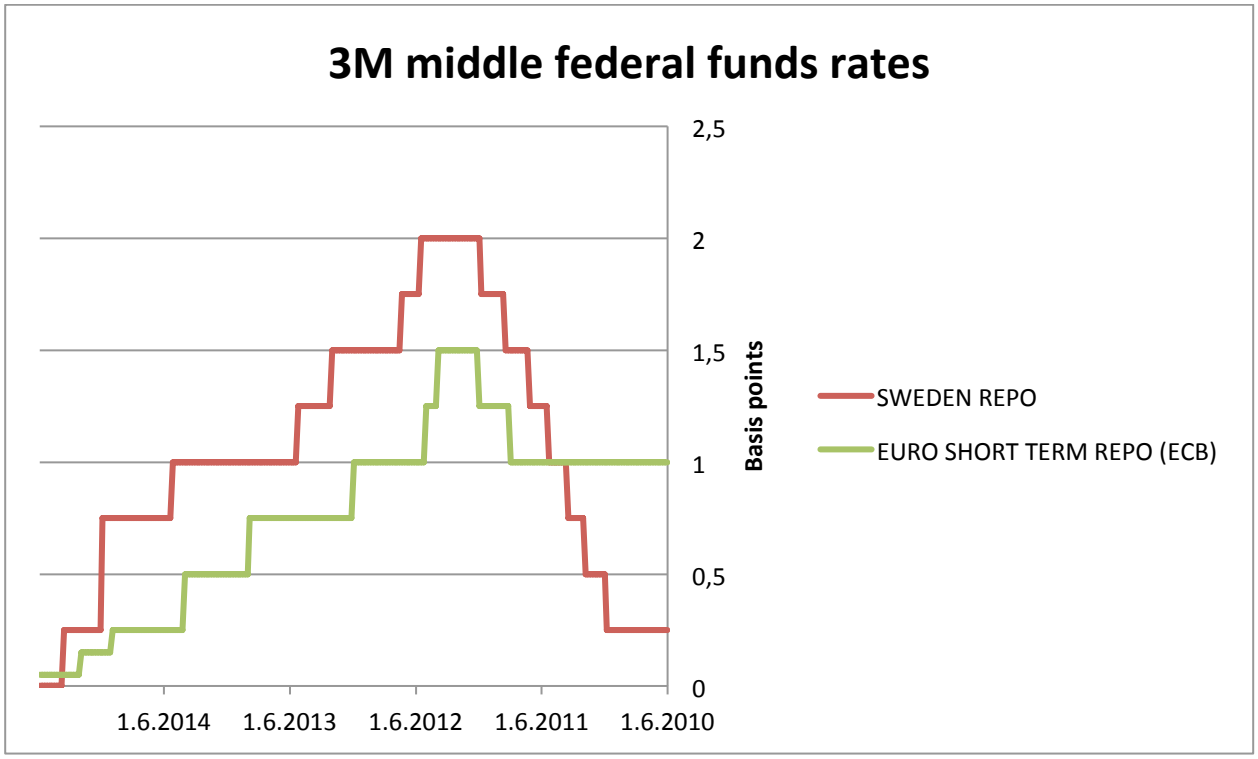


Source: Data retrieved from Datastream.

*Inflation as measured by the annual growth rate of the GDP implicit deflator and shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.

The global economy was also uncertain. Eurozone countries were struggling with low productivity and high government debts (SHB, 2010). In late 2011, the Swedish economy slowed down and the development in the Euro-area and in the US was somewhat mixed. In 2012, the macro-economic situation worsened. Annual GDP growth as well as the annual growth in inflation fell for Sweden and all their important trade countries except Norway. Sweden, Denmark, the Netherlands and Finland were all in a recession. The economic slowdown was further amplified by the plummeting inflation rates. In 2013 and 2014, Sweden experienced deflation.

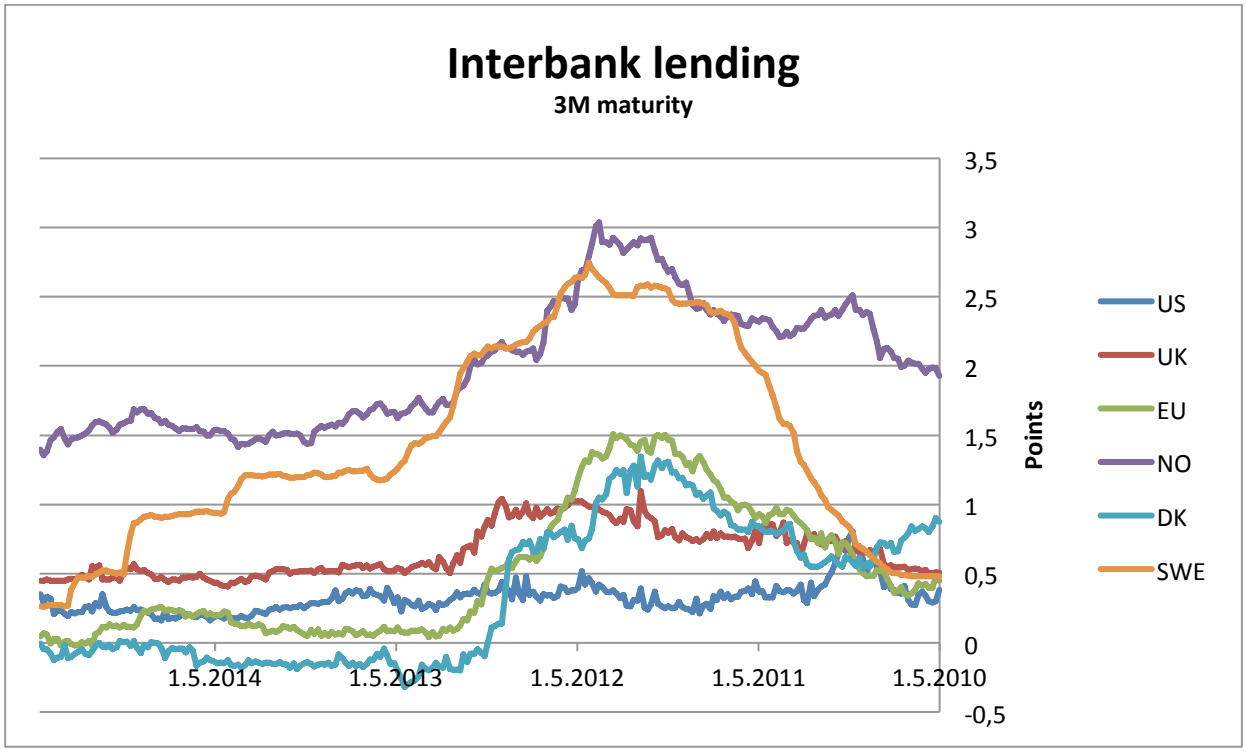
Figure 10: Federal funds rate



Source: Data retrieved from Datastream.

The European Central bank and the Swedish Central bank responded to the slowdown in 2011 with expansive monetary policy. Both the Swedish federal funds rate and the ECB federal funds rate started a steep descent in late 2011 which continued all the consecutive years of the analysis. The interbank lending followed immediately and interbank rates started to decrease in December 2011.

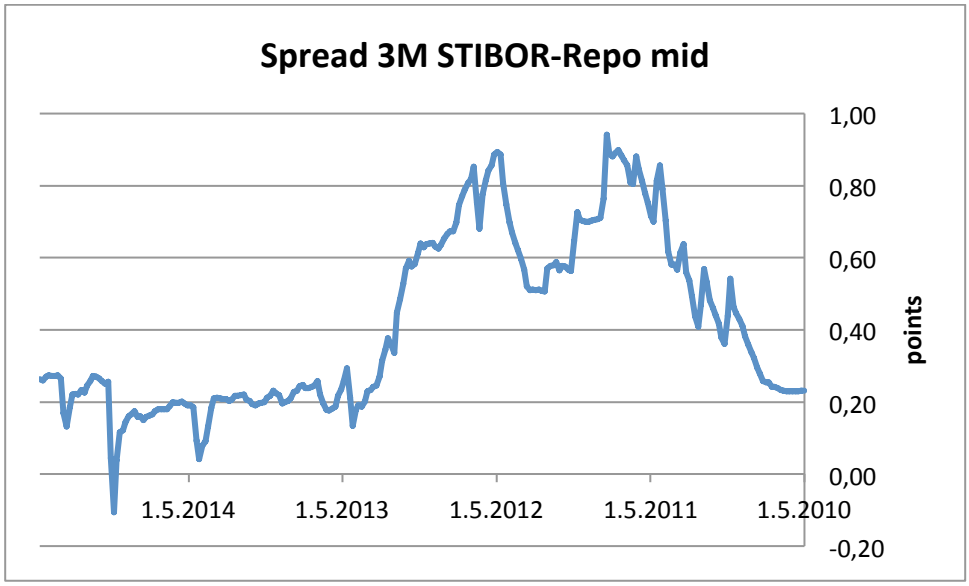
Figure 11: Interbank lending rates



Source: Sveriges Riksbank (2016).

When the Swedish Central bank exited the expansive monetary policy in 2010 it was expected that the interbank rates were going to increase. However, the extent of the effect was hard to quantify and the volatility proved to be underestimated (Elmér, et al; 2012). Figure 12 illustrates the effect by the spread between the 3-month STIBOR and the middle Swedish Federal Funds rate.

Figure 12: Spread STIBOR-Repo



Source: Conducted by author. Data retrieved from Sveriges Riksbank (2016).

During 2010, the STIBOR increased more than the Swedish federal funds rate. The spread stayed high during the following two years with a peak in early 2011 as well as in early 2012. The large spread indicates that there were some risk factors which applied to the Swedish banks during this time. The spread started to decrease in 2012 and has been low and stable in 2013 and 2014.

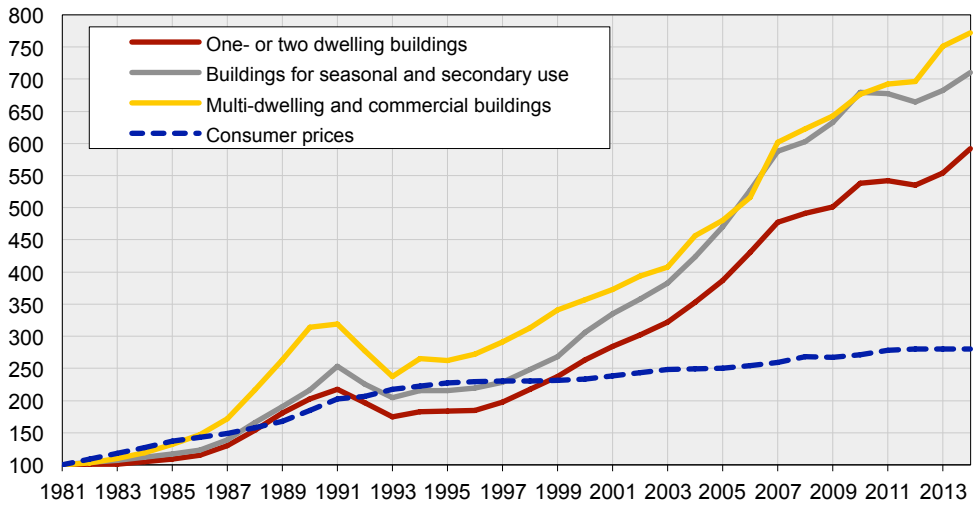
7.2.3 2014 and onwards

According to the report by Finansinspektionen (2013), the most important risk factor for Swedish economy is the macro-economic situation in the Euro-area, volatility in the international financial sector and a price drop in the housing market.

The Swedish SIFI banks have a funding gap, which means that the lending to the public is much larger than the deposits received from the public. This makes them to a large extent dependent on market financing. Each year, the Swedish banks need to refinance an amount equal in size as half of the Swedish GDP. This makes them particularly vulnerable to changes in the international financial markets. The Swedish banks also have a structural liquidity risk by the maturity transformation mechanism which is higher than other European banks. The structural liquidity risk applies when there is a large gap in the maturity matching of lending and funding. The short-term liquidity risk can be measured by the LCR-ratio while the long-term liquidity risk is measured by the NSFR-ratio. The NSFR has not been implemented yet but when it will, it is supposed to be at least 1. In June

2013, the Swedish SIFIs held on average a ratio of 0,83 which is lower than most European banks (Finansinspektionen, 2013).

Figure 13: Real estate price index Sweden



Source: SCB (2015)

Housing prices in Sweden have increased at a fast pace during the last years as well as the debt ratio for the Swedish households. In 2014, the households had a debt ratio of 170% of disposable income. Due to the banks' large exposure to the housing market through mortgage lending, a drop in housing prices could decrease the confidence in the stability of Swedish banks. This may in term affect the ability for financing.

FI assesses that another, and perhaps more likely, consequence of a drop in the housing prices would go through the macro-economic channel by decreased consumption and lower GDP-growth. This effect might be amplified by the high debt ratio for Swedish households.

There is always uncertainty connected to assessing the fundamental factors that drives the development in housing prices and hence, whether they are overvalued. However, the consequences if they in fact are can be supported in empirical studies which show that a drop in housing prices affects the private consumption negatively (Finansinspektionen, 2014b).

7.2.3.1 Regulation to mitigate the risks connected to the housing prices

FI has proposed and implemented a number of measures to mitigate the vulnerabilities connected to the high debt levels and the housing market.

In October 2010, the FI implemented the mortgage roof regulated through FFFS 2010:2. The requirements imply that the mortgage could be a maximum of 85% of the total value of the residence.

In 2013, FI implemented the risk weight floor on mortgage loans. This means that the capital requirements for mortgage loans calculated by the IRB-method must be higher than 15%. In 2014, this was increased to 25%.

In November 2014, FI announced that there will be implemented an amortization requirement for new mortgage loans. It implies that new mortgage loans must be amortized with 2% of the initial loan until it reaches 70% and thereafter with 1% until it reaches 50% (Finansinspektionen, 2014b).

8 Internal risk analysis

The purpose of the internal risk analysis is to reveal the strategic focus related to risk and return for the four Swedish SIFIs. It starts with a presentation of the banks' position in the market. To illustrate the differences between the four banks in their strategic focus and its effect on risk and return, the author has conducted a strategic analysis which focuses on comparison of relevant pre-determined factors. The banks are then ranked in terms of how the banks communicate their strategy in terms of risk. Lastly the results are compared with how the market perceives their riskiness through the CDS-spreads.

8.1 Market positions

The four Swedish SIFIs offer all kinds of financial services and are so-called "full service"-banks or universal banks. In 2014, their total market share on the deposit market was 63% but varies considerably on other submarkets (Swedish Bankers Association, 2014).

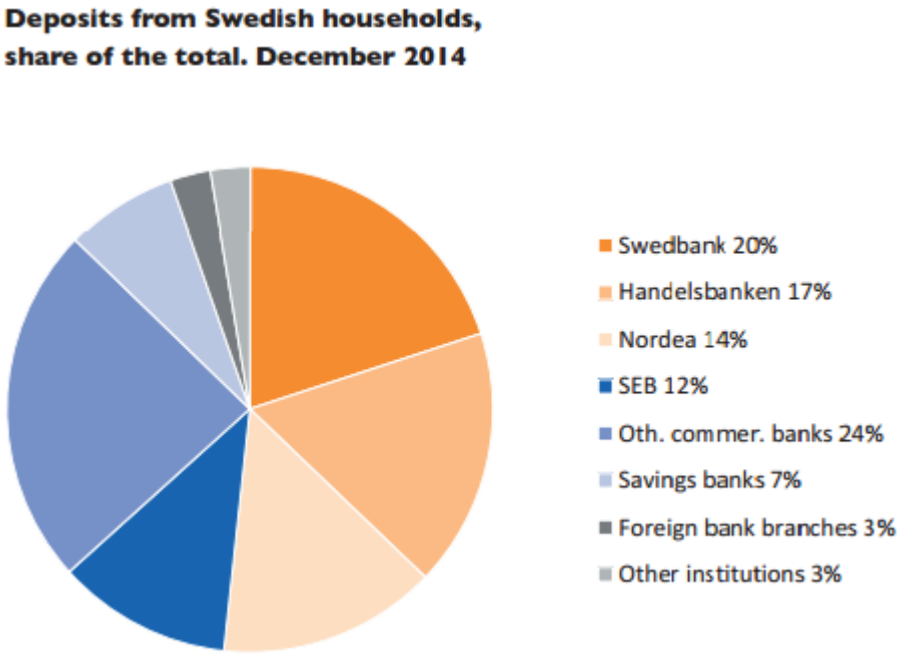
Table 1: The four Swedish SIFIs

	Employees (2013)		Lending to the public	Total Balance
	Total	Of which Sweden	SEK Billions	SEK Billions
Nordea[1]	29 429	6 881	3 270	6 287
Handelsbanken	11 503	7 537	1 808	2 817
SEB	17 096	8 553	1 356	2 641
Swedbank	16 022	8 501	1 405	2 121

1 The figures for Nordea relate to the entire Nordea Group, where the bank's activities in the other Nordic countries are also included.

Source: Swedish Bankers Association (2014).

Figure 14: Deposits from Swedish households, share of the total



Source: Swedish Bankers Association (2014).

Nordea is the largest bank in terms of total employees and total balance while Swedbank is the largest in terms of share of deposits from Swedish households. The four banks are similar but also different in for example client-types, pricing of services and distribution channels (Swedish Bankers Association, 2014).

8.2 Strategic risk analysis

The information is based on the risk and return communicated in the Pillar 3 reports and annual reports from 2014.

The author has categorized the relevant strategic factors in terms of company specific factors, risk management and corporate governance.

Table 2: Strategic risk management

Company information				
	Swedbank	SHB	SEB	Nordea
Year founded	1820	1871	1856	1820
Geographical exposure	Home markets in Sweden, Estonia, Latvia and Lithuania. Operates in 11 countries.	Home markets in Sweden, Denmark, UK, Finland, Norway and the Netherlands. Operates in 24 countries.	Operates in Sweden, Estonia, Latvia and Lithuania. Corporate banking in Denmark, Norway, Finland and Germany	Lending banks in Sweden, Finland, Denmark and Norway. Most diversified bank in the Nordics.
Business model/strategy	Strategy: Create sustainable value for customers, employees, shareholders and society. Business model: Be low risk- and high cost efficient with decision-making close to the costumer.	The goal is that no credit will lead to a loss. Being well capitalized at all times assures soundness even in stressed situations and SHB is not affected by fluctuations in business cycle or market situation.	Strategic focus is long-term customer relationships built upon a strong financial position. Ambition to be the leading Nordic bank for large corporations and financial institutions and the top universal bank in Sweden and the Baltic countries.	Strategic goal is to be a great European bank acknowledged for its people, creating superior value for customers and shareholders. Nordea aims at being a relationship bank and value great costumer experience.
Risk management				
	Swedbank	SHB	SEB	Nordea
Risk appetite	Maintain a low risk profile, in terms of both capital and liquidity.	Very restrictive view of risk	Balance the trade-off between financial reward and overall risk tolerance.	The level and the nature of risk taken is based on the strategy articulated by the shareholders.
Capital planning	Maintain an extra capital buffer on top of what is legally required Aims to hold a capital ratio which ensures a high return on shareholder equity at the same time as meeting the capital requirements and maintaining access to cost-efficient funding in the capital markets.	In 2010, the low risk profile of the credit portfolio resulted in lower capital requirements for credit risk compared to peers.	Maintain a capital target for CET1 of 150 basis points above the Swedish requirement. Should be based on regulatory requirements and the required level of debt that ensures financing	Target minimum of 13% in CET1 and 17% total capital ratio.
Corporate Governance				
	Swedbank	SHB	SEB	Nordea
Remuneration	Majority have both fixed and variable components. Is designed to reduce the risk of excessive risk-taking. The CEO has only fixed remuneration	Based on fixed payment which is in line with the long-term perspective. Profit-sharing scheme through Oktogonen with distribution of profits regardless of position.	Consists of fixed and variable pay. Offers special equity based remuneration to selected key employees that is based on individual performance.	Based on fixed and variable pay. Variable salary is offered to selected managers and specialists to reward strong performance.
Ownership	Swedish shareholders hold 60% with Swedish legal entities holding 52% and individual investors holding 9%. The largest shareholder is Folksam (9,27%) and Sparbanksgruppen medlemsbanker (8,55%).	Swedish shareholders hold 48%. The largest single shareholder is Industrivärlden (10,17%) and Oktogonen foundation (10,14%).	Swedish shareholders hold 73,4%. 48,1% is held by Swedish institutions and foundations while 12% is held by private individuals. Investor AB is the largest shareholder with 20,8% of the share capital and 20,9% of the votes. The ten largest shareholders account for 48% of capital and votes.	Nordic companies and institutions held 47% of the shares while non-Nordic entities held 31%. Finnish Sampo plc is the largest single shareholder with holdings of 21,4%.
Risk	2	1	4	3

Source: Conducted by author.

All the banks mention the Basel III and CRR/CRD IV regulation as one of the main points in their Pillar 3 reports already in 2010 while SEB does not mention it until 2012. This illustrates and emphasizes the significance of the new regulation on risk- and capital management.

Common for all banks is that risk appetite is determined by the board which also has the ultimate responsibility for the banks' risk taking and capital assessment. The board also decides on the remuneration policies.

Nordea is the most diversified bank. However, with diversity comes complexity so it is difficult to say whether the net effect on risk is positive or negative.

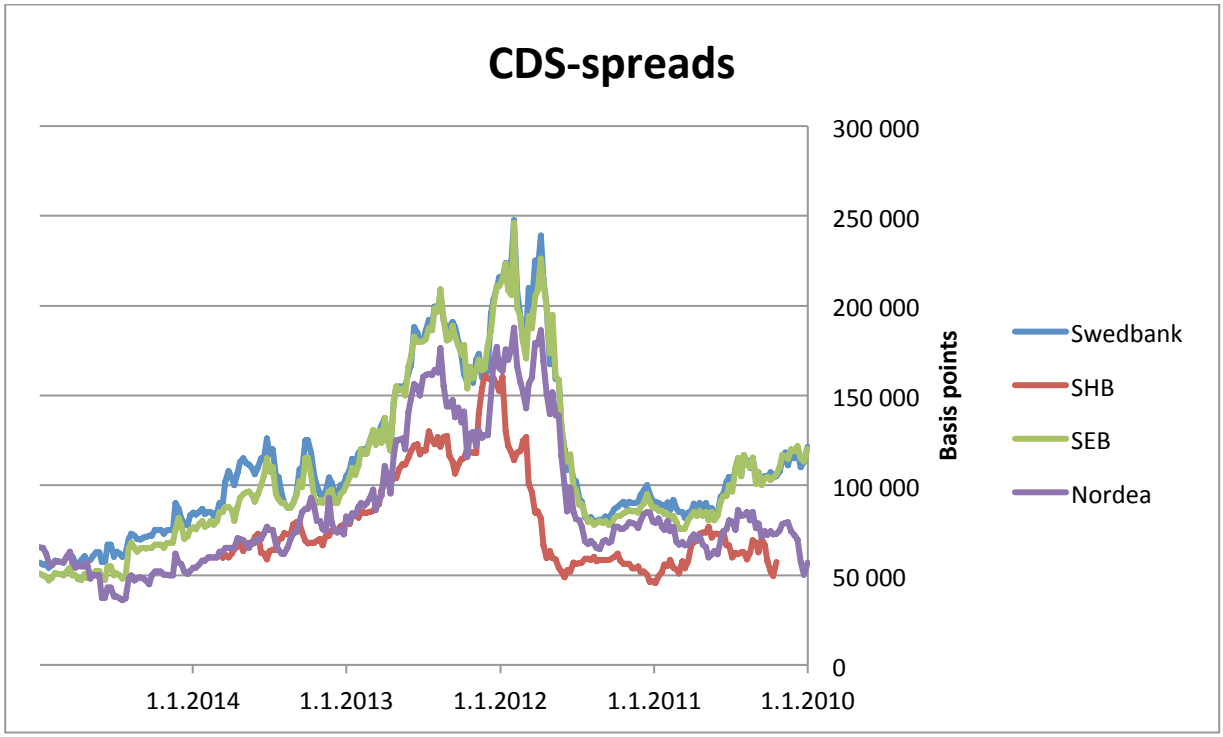
SHB has the most restrictive risk appetite as well as a fixed remuneration system. Their restrictive view on risk is also communicated in a clear way though their strategy. SEB on the other hand acknowledge the balance between financial reward and risk tolerance and has a variable remuneration system that is based on individual performance. They are also focusing on large corporations which are the group with the highest risk weights in the calculation of REA.

Nordea communicates their target minimum CET1 and total capital ratio in an explicit way. However, it is less clear how they will receive the goal.

The author's assessment of the risk based on the strategic analysis is that SHB aims to hold the lowest risk while SEB aims at holding the highest risk. Swedbank and Nordea is placed in between with Swedbank less risky than Nordea.

8.3 CDS-spreads

Figure 15: CDS-spreads



Source: Data retrieved from Bloomberg.

The figure shows the 5-year CDS-spread for the four Swedish SIFIs nominated in Euros with weekly observations. Under the assumption of efficient markets, the CDS-spreads reflect the cost of insuring against credit default. Hence, if the spread is 0, the bank is considered risk-free.

From the start of 2010 to mid-2011, Swedbank and SEB got more robust, and SEB and Nordea were stable. During mid-2011, CDS-spreads rose and were at a peak at the end of 2011. In half a year, it had become between two and three times as expensive to insure against a credit default for the four Swedish SIFIs. The spreads remained high for approximately a year and spreads started to fall in mid-2012 and has continued to fall until end of 2014. The largest decrease in the markets perception of risk occurred in 2012 for all four banks. The reason for the increase in the CDS-spread in late 2014 for Nordea might be due to firm-specific factors as the macro-economic situation was fairly stable during this period.

8.4 Partly conclusion from the macro-economic analysis and the internal risk analysis

The four banks show signs of being more robust during the period with the largest decrease in risk mainly attributable to two years, 2012 and 2014.

The strategic analysis is not aligning perfectly with how the market perceives the banks in terms of riskiness. By looking at the CDS-spreads, the market perceives SHB as the most resilient bank followed by Nordea. The market perceives Swedbank as the riskiest bank with SEB perceived almost as risky.

In 2012, the market interprets all four banks as less risky which is illustrated by the large decrease in the banks CDS-spreads. Also the financial market assess the banks as more robust through the decrease in the STIBOR-repo rate spread. The fact that the banks manage to convince the financial markets that they are more robust during 2012 despite this being a turbulent macro-economic situation indicates that there are some industry-specific factors that apply to financial institutions. However, the spread of the European financials and the general European market shows contradicting results. The spread is somewhat volatile during the year with two significant peaks indicating that European financial institutions were relatively more risky than the market. For 2014, however, the spread is close to zero and hence, is perceived as relatively less risky than in previous periods.

9 Financial analysis

The purpose of the financial analysis is to reveal how the changes in the risk perceived by the market relate to changes in financial management. The aim is to determine the risk in a quantitative manner. The section begins with an analysis of the changes in capital ratios, followed by an analysis of the risk weighted exposure (REA). The REA is further analyzed by dividing it into the relevant components with the main focus being on the credit risk. For credit risk exposure the EAD and RW is the main drivers. Further, a short analysis of the market risk exposure and the liquidity ratio is conducted.

9.1 Assumptions and methodology

The financial analysis is based on numbers retrieved from the risk management (Pillar 3) reports by Swedbank, SHB, SEB and Nordea for the 5 years 2010-2014. As the focus of the thesis is on capital ratios, the aim is to analyze the change in capital and risk management over the period.

As management of risk and capital are core success factors in the financial services industry, I assume that changes that occur regarding capital allocation and level are strategic. This is based on the assumption that banks seek to maximize the return for the shareholders and therefore balances the trade-off between risk and return. However, careful consideration must be made when comparing the exposure numbers between the banks. Even though the banks are required to report according to Pillar 3, definitions may differ which might have consequences for the conclusion drawn from it.

Banks can increase capital ratios in mainly two ways:

- Increase capital by either issuing new shares and/or not pay dividends to its shareholders i.e. to retain profits.
- Reduce risk-weighted assets by cutting back on lending, sell loan portfolios and/or make less risky loans and investments.

9.2 Limitations

All four SIFIs use the IRB-approach and the standardized approach to calculate the credit exposures. However, the distribution between the two methods differs both between banks and between years. The consequence is that part of the changes in average RWs might be due to changes in the methods applied.

As the numbers for Nordea is nominated in euro, the author has converted the numbers to SEK assure comparability. The exchange rates for 31st of December are applied in each of the five years. This implies that part of the changes in the numbers for Nordea is because of changes in exchange rates. See appendix 8.

All the figures in the financial analysis is based on numbers retrieved from the Pillar 3 reports for the four Swedish SIFIs for the years 2010-2014.

9.3 Analysis

9.3.1 Capital ratios

Figure 16: CET1 capital ratio

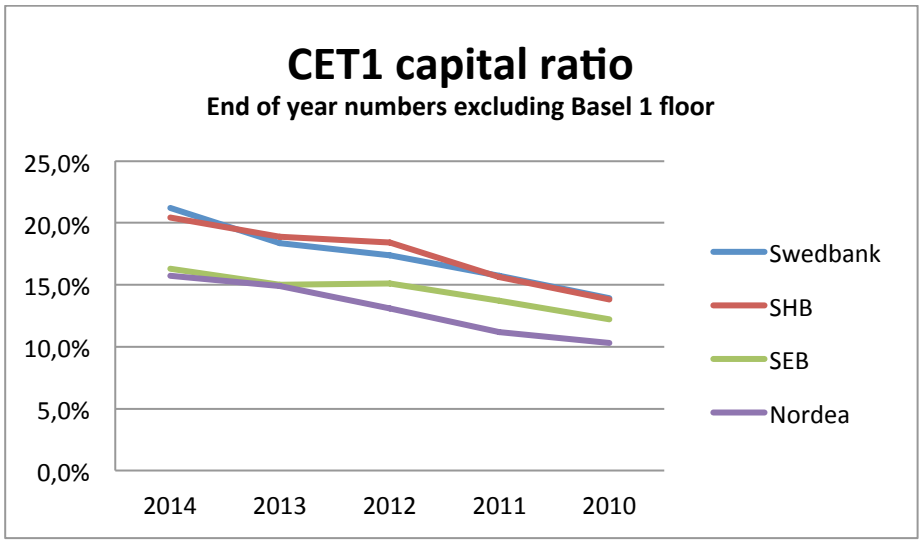
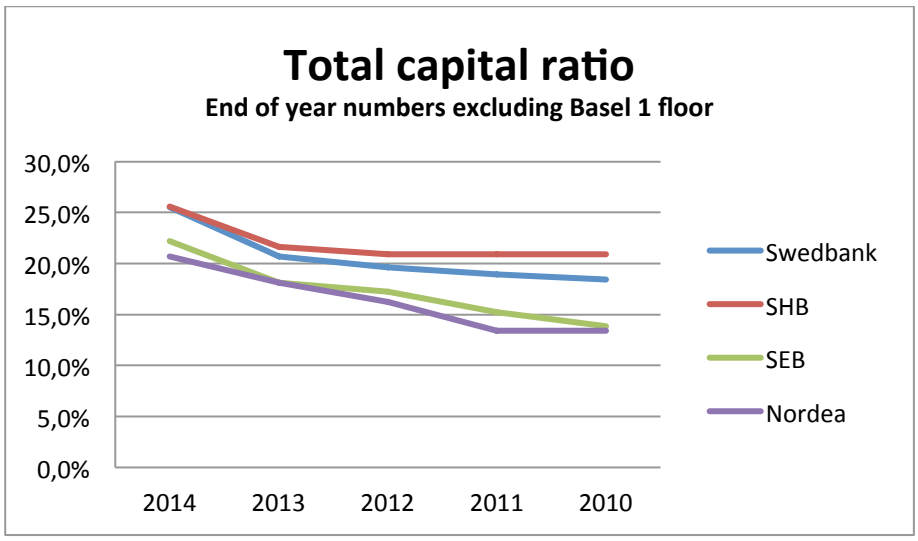


Figure 17: Total capital ratio



The banks have increased both the total- and CET1 capital ratio during the whole period with the largest increases occurring in 2012 and 2014.

The table below reflects the changes in the capital ratios and the changes in the CDS-spreads. The red numbers for the CDS-spreads represents an increase in the CDS-spreads and indicate that the market perceives the

banks as less robust. The red numbers for the capital ratios indicate that there has been no change or a decrease in the capital ratios during the period. The bold numbers indicate when the largest decrease in CDS-spreads occurred as well as the largest increase in capital ratios.

Table 3: Change in capital ratios and CDS-spreads

Swedbank				
Change (excl. Transitional rules)	2014	2013	2012	2011
CDS-spread	-33%	-22%	**-50%**	136%
CET1 capital ratio (excluding Basel I floor)	**13,4%**	7,7%	10,7%	13,0%
Total capital ratio (excluding Basel I floor)	**26,9%**	2,3%	3,7%	2,9%

SHB				
Change (excl. Transitional rules)	**2014**	**2013**	**2012**	**2011**
CDS-spread			**-53%**	183%
CET1 capital ratio (excluding Basel I floor)	6,2%	4,5%	**17,9%**	13,0%
Total capital ratio (excluding Basel I floor)	**18,6%**	3,2%	0,0%	0,0%

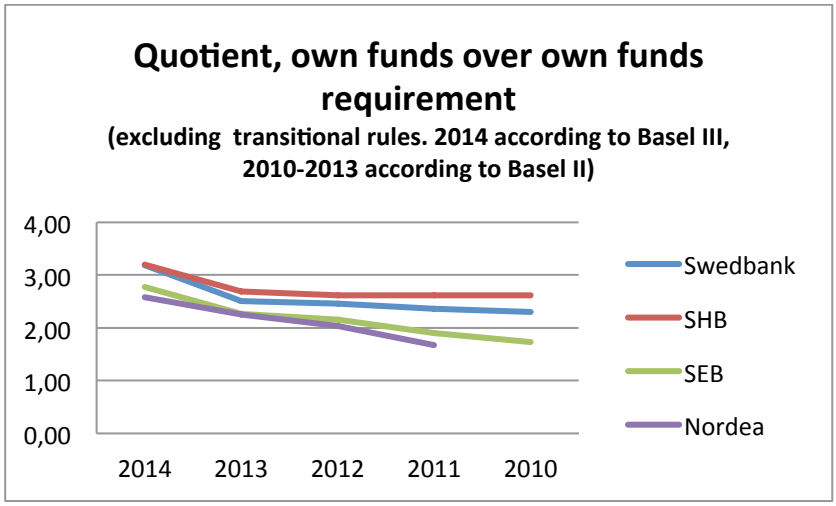
SEB				
Change (excl. Transitional rules)	**2014**	**2013**	**2012**	**2011**
CDS-spread	-33%	-27%	**-51%**	145%
CET1 capital ratio (excluding Basel I floor)	8,7%	-0,5%	**10,0%**	12,4%
Total capital ratio (excluding Basel I floor)	**22,7%**	5,1%	13,0%	10,1%

Nordea				
Change (excl. Transitional rules)	**2014**	**2013**	**2012**	**2011**
CDS-spread	21%	-32%	**-51%**	107%
CET1 capital ratio (excluding Basel I floor)	5,4%	13,7%	**17,0%**	8,7%
Total capital ratio (excluding Basel I floor)	14,4%	11,7%	**20,9%**	0,0%

Source Conducted by author. See appendix 3

In 2012, the largest decrease in CDS-spreads for the period analyzed occurred for all the four banks. The same year, the largest increases in CET1 capital ratio for the period analyzed occurred for SHB, SEB and Nordea. For SEB and Nordea, also the largest decrease in Total capital ratio occurred this year. Hence, increased capital ratios coincide with the markets perception of more robust banks despite turbulent macro-economic developments during this year. For Swedbank, the largest increases for both capital ratios occurred in 2014.

Figure 18: Quotient, own funds over minimum capital requirements



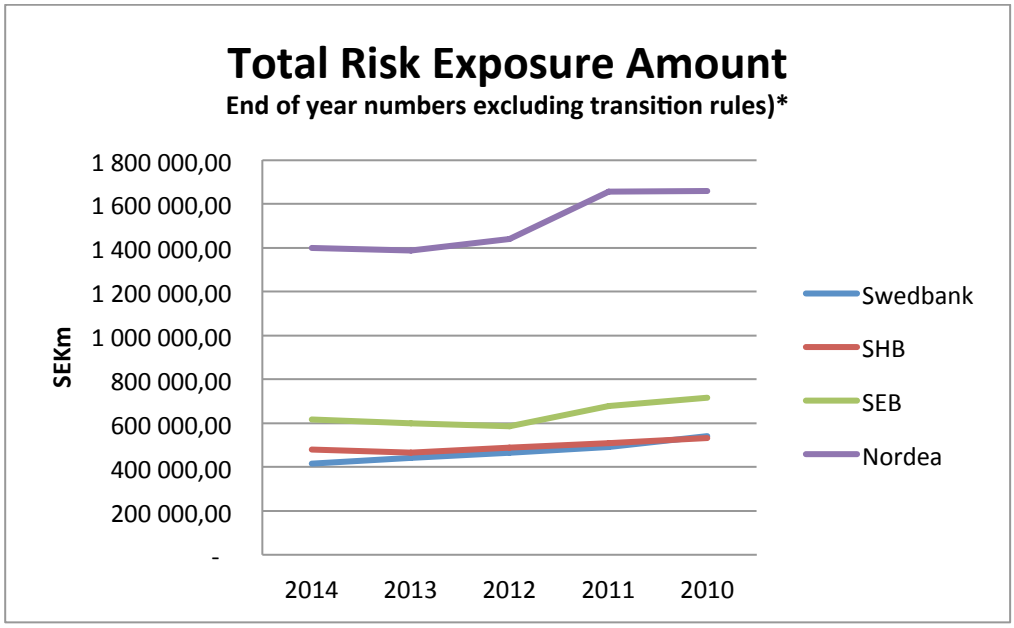
Source: Conducted by author. See appendix 4.

The quotient represents the capital held above the minimum capital requirement of 8%. SHB has the highest quotient, which is in line with the strategic analysis. Nordea maintains the lowest quotient. In 2014 when the first stage of CRR/CRD IV was implemented, a jump in the quotient occurred for all banks. Both Swedbank and SEB acknowledge in their Pillar 3 reports that the reason for holding higher capital requirements is to be able to get external financing.

9.3.1.1 Total Risk Exposure Amount

The Total Risk Exposure amount (REA) is the foundation for the capital requirement calculations. It is divided into three types of exposures: Credit risk, Market risk and Operational risk.

Figure 19: Total REA



*Nordea is subject to changes in exchange rates. For conversion from EUR to SEK, see appendix 5 and 8.

The total risk exposure amount has decreased during the period for all four banks with the largest decrease occurring in 2012. Due to changes in exchange rates, the reader should be aware that the change in total REA for Nordea between 2013 and 2014 is subject to a 6,3% decrease instead of a 1% increase. The change is accounted for in Table 4.

The numbers below shows how the changes in capital ratios are attributable to either changes in REA or in capital held.

Table 4: Changes in capital ratios

Swedbank				
Change (excl. Transitional rules)	2014	2013	2012	2011
CET1 capital ratio (excluding Basel I floor)	**13,4%**	**7,7%**	**10,7%**	**13,0%**
REA (excluding Basel I floor)	-8,3%	-2,7%	-5,7%	-9,0%
CET1 capital	3,9%	4,8%	4,4%	
Total capital ratio (excluding Basel I floor)	**26,9%**	**2,3%**	**3,7%**	**2,9%**
REA (excluding Basel I floor)	-8,3%	-2,7%	-5,7%	-9,0%
Total Own funds	16,3%	-0,4%	-2,2%	-6,5%

SHB

Change (excl. Transitional rules)	2014	2013	2012	2011
CET1 capital ratio (excluding Basel I floor)	**6,2%**	**4,5%**	**17,9%**	**13,0%**
REA (excluding Basel I floor)	3,2%	-4,6%	-3,9%	-4,5%
CET1 capital	9,5%	-0,4%	13,3%	8,0%
Total capital ratio (excluding Basel I floor)	**18,6%**	**3,2%**	**0,0%**	**0,0%**
REA (excluding Basel I floor)	3,2%	-4,6%	-3,9%	-4,5%
Total Own funds	22,4%	-1,6%	-3,9%	-4,5%

SEB

Change (excl. Transitional rules)	2014	2013	2012	2011
CET1 capital ratio (excluding Basel I floor)	**8,7%**	**-0,5%**	**10,0%**	**12,4%**
REA (excluding Basel I floor)	3,0%	2,1%	-13,7%	-5,2%
CET1 capital	12,0%	1,6%	-5,1%	6,5%
Total capital ratio (excluding Basel I floor)	**22,7%**	**5,1%**	**13,0%**	**10,1%**
REA (excluding Basel I floor)	3,0%	2,1%	-13,7%	-5,2%
Total Own funds	26,5%	7,3%	-2,5%	4,3%

Nordea*

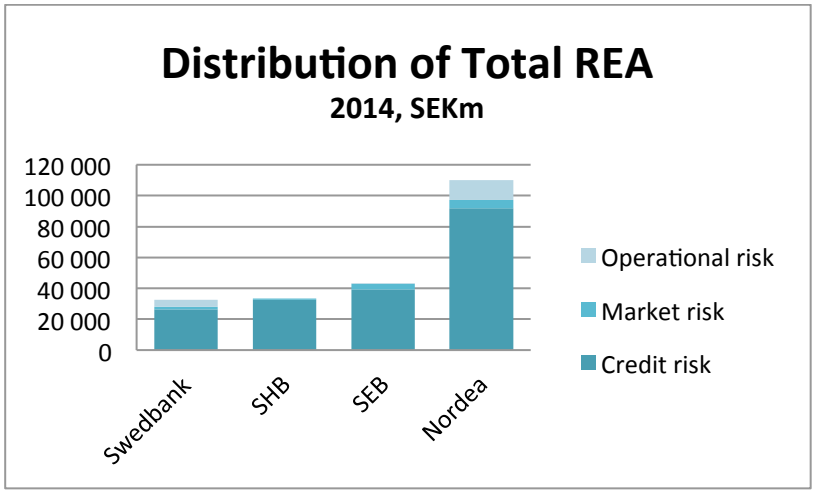
Change (excl. Transitional rules)	2014	2013	2012	2011
CET1 capital ratio (excluding Basel I floor)	**5,4%**	**13,7%**	**17,0%**	**8,7%**
REA (excluding Basel I floor)	-6,3%	-7,5%	-9,3%	0,1%
CET1 capital	-1,3%	5,0%	6,3%	
Total capital ratio (excluding Basel I floor)	**14,4%**	**11,7%**	**20,9%**	**0,0%**
REA (excluding Basel I floor)	-6,3%	-7,5%	-9,3%	0,1%
Total Own funds	7,1%	2,6%	10,1%	

*Denominated in EUR. For conversion from EUR to SEK, see appendix 5.

Source: Conducted by author. See appendix 4

For SHB and SEB, the increases in the capital ratios in the period prior 2014 were mainly attributable to decreases in REA while the increases in capital ratios in 2014 were mainly due to more capital held. For Swedbank and Nordea, the increases in capital ratios due to REA are occurring the whole period. However, Swedbank increased their total own funds significantly in 2014.

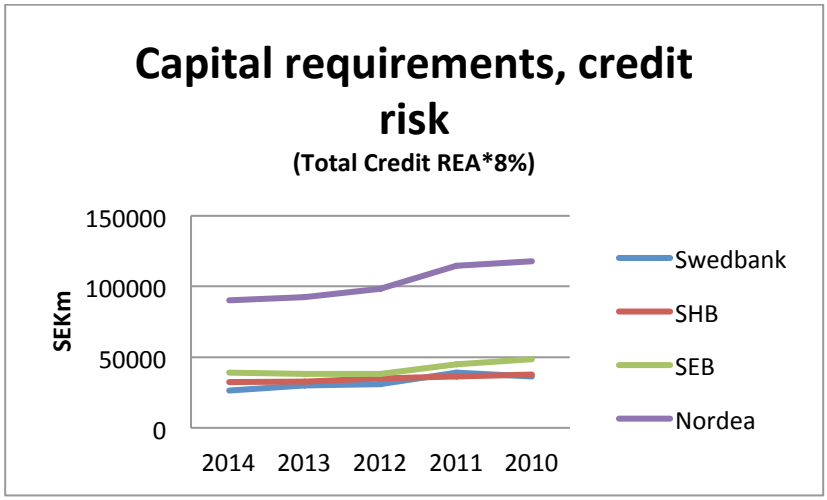
Figure 20: Distribution of Total REA



Credit risk is by far the largest contributor to the total REA with between 83% (Swedbank) and 97% (SHB) on average for the five years. Hence, the author has focused on changes in the credit risk to explain the changes in REA.

9.3.2 Credit risk exposure analysis

Figure 21: Capital requirements, credit risk

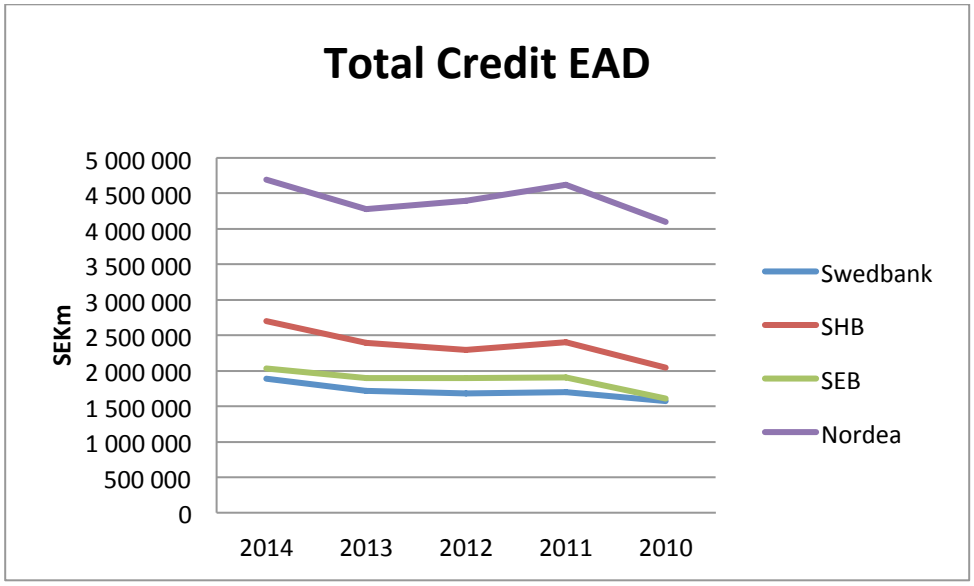


The changes in credit REA looks very similar as for the total REA due to the large contribution of credit risk to the total amount. The largest decrease occurred in 2012 for all four banks.

The credit REA can be divided into the non-risk weighted amount (EAD) and the value of the Risk Weight (RW) applied.

9.3.2.1 Exposure At Default

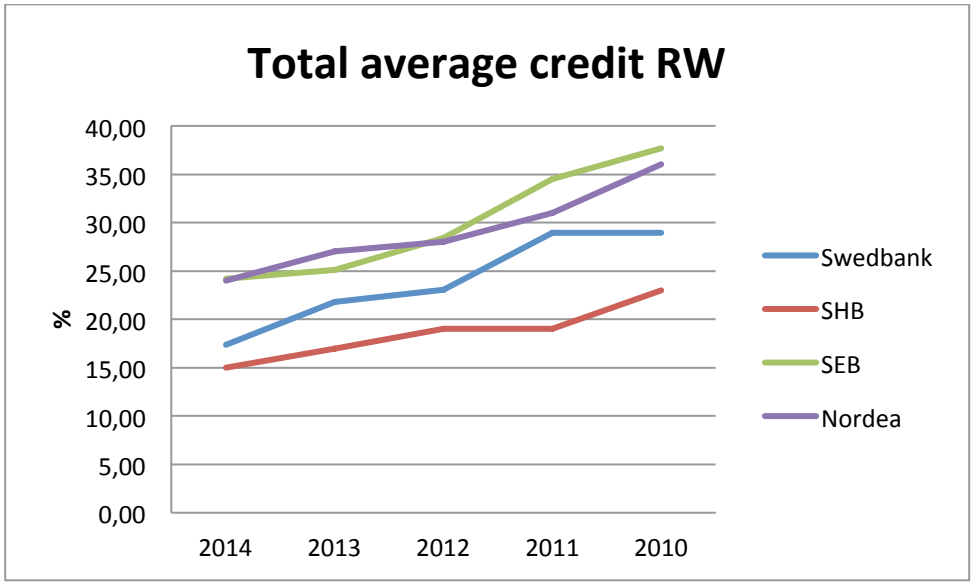
Figure 22: Total Credit EAD



Credit EAD shows the non-risk weighted exposure and is representing the nominal market value of the banks' on-balance sheet loan assets and off-balance sheet loan assets. The non-risk exposure amount has been relatively stable with an increasing trend during the period despite differing macro-economic developments. The results show no signs of a contraction in lending but rather an expansion. The EAD is moving in the opposite direction from the REA during the period.

9.3.2.2 Risk Weights

Figure 23: Total Average credit RW



The other component of credit REA is RW. As can be seen in the figure, the total average credit RW has decreased significantly during the period for all four banks. For Swedbank and SEB, the largest decrease occurred in 2012, a year with turbulent macro-economic developments. This is somewhat surprising as turbulent macro-economic developments should increase the risk through higher PD-rates and hence the RWs applied. However, RWs are based on past values. Hence, if we assume a lag of at least 1 year, the decrease in RW is somewhat more moderate but shows nevertheless a decreasing trend.

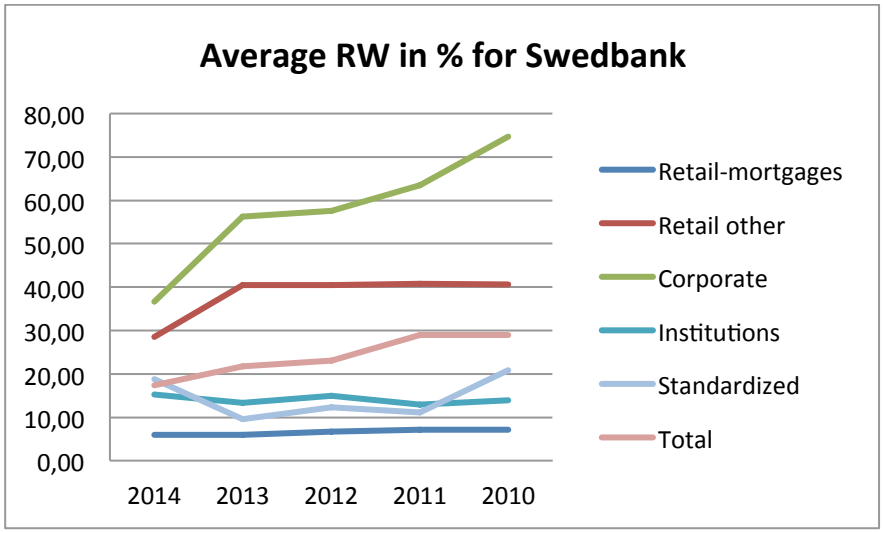
Table 5: Changes in Credit REA

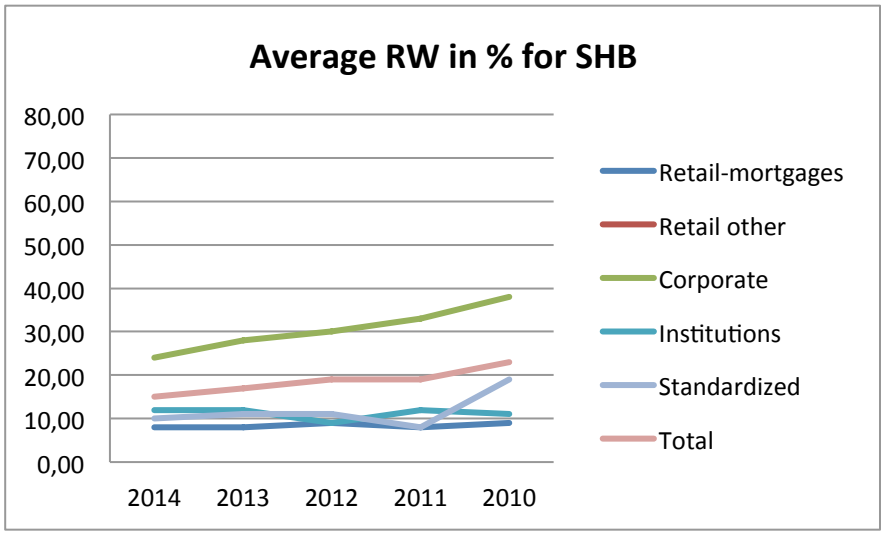
Total change 2010-2014	SWEDBANK	SHB	SEB	NOR
EAD	20,3%	32,0%	26,3%	14,5%
RW	**-40,0%**	**-34,8%**	**-35,8%**	**-33,3%**
REA	-27,8%	-13,9%	-18,9%	-23,7%

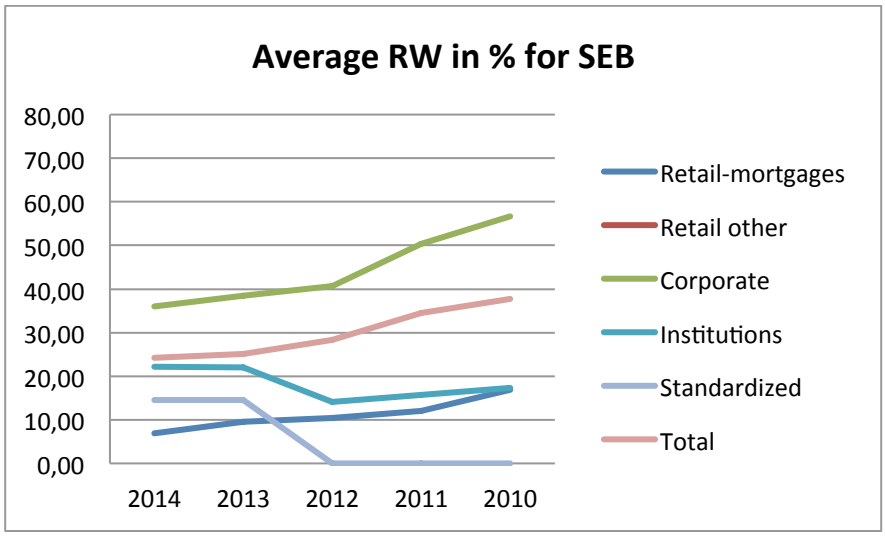
Source: Conducted by author. See appendix 6a-e.

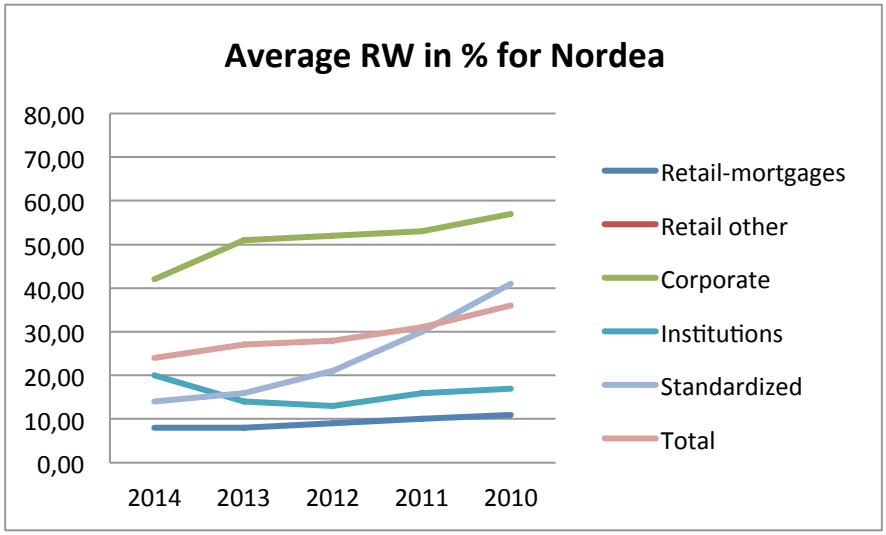
Further, the RWs are divided into individual exposure classes.

Figure 24: Average RW for exposure classes









The author focus on two trends common for all banks: The corporate RW calculated by the IRB-method is by far the highest and shows a decreasing trend with the largest decreases occurring in 2014 for Swedbank and Nordea. For SEB the largest decrease occurred in 2012 while the corporate RW decreased at a more stable rate during the whole period for SHB. The other trend is the increased RW for institutions which have moved in the opposite direction from the other exposure classes.

The banks can partly manage the changes in the average RWs by using derivatives or collateral. This is measurable in a quantitative manner through the LGD rates. Decreased LGD-rates should decrease the RW-rates everything else equal.

Table 6: Changes in Corporate Credit REA and Institutional Credit REA

Change in Corporate exposure

2010-2014	SWEDBANK	SHB	SEB*	NOR
EAD	18,3%	11,6%	34,5%	17,1%
RW	-51,0%	-36,8%	-36,4%	-26,3%
REA	-42,1%	-29,5%	-14,5%	-13,7%
LGD	**-41%**	**-13%**		**-13%**

Change in Institutional exposure

2010-2014	SWEDBANK	SHB	SEB*	NOR
EAD	-7,0%	-26,0%	-29,0%	-4,7%
RW	9,9%	9,1%	27,7%	17,6%
REA	2,2%	-19,2%	-9,3%	12,1%
LGD	**-26%**	**-21%**		**-4%**

**There are no comparable numbers for SEB*

Source: Conducted by author. See Appendix 6a-e.

The Corporate LGD-rates have decreased during the period but not as much as the RW-rates. This indicates that the decreases in Corporate RW-rates are partly due to external factors.

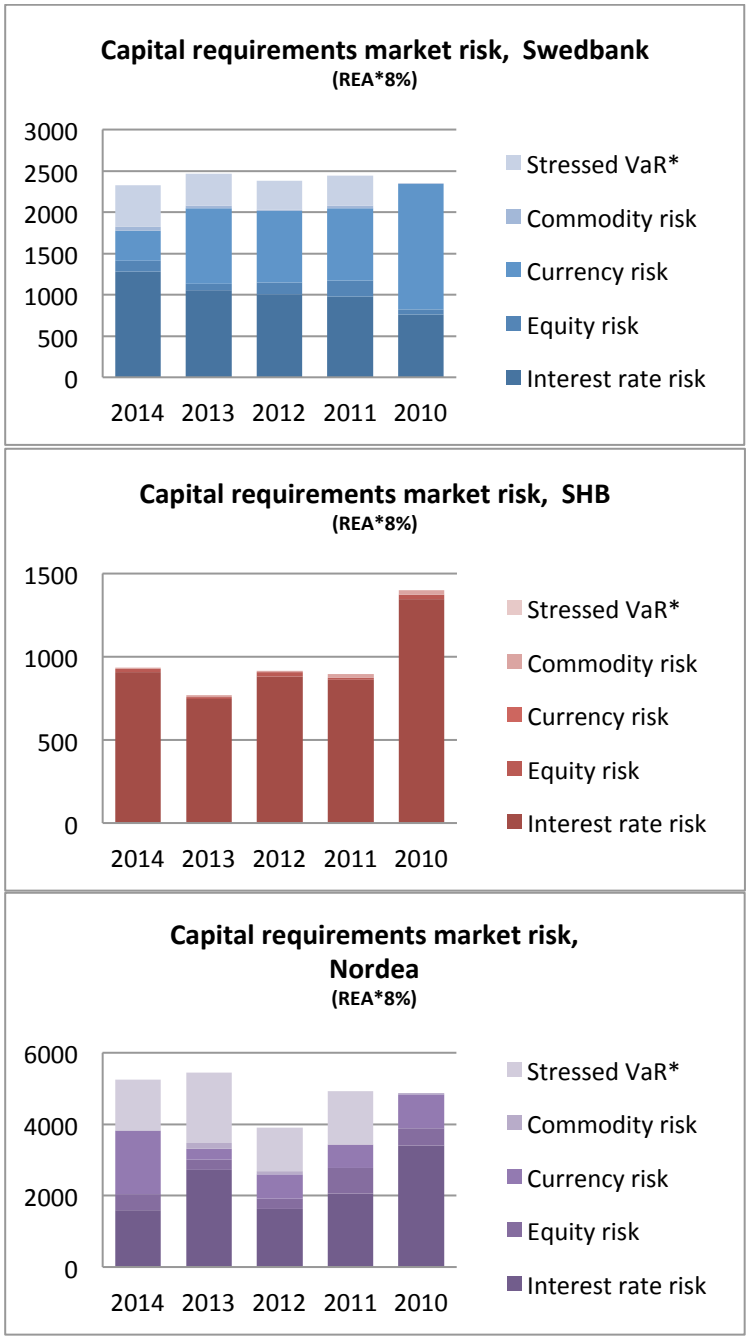
The LGD-rates for institutions also show a decreasing trend. However, although all four banks have engaged in loss-mitigating activities for institutional exposures, the risk, measured by the RW-rates, nevertheless show an increasing trend. Recall that the institutional exposure in the IRB-method refers to exposures to counterparties defined as banks and other credit institutions and certain investment firms. Hence, the data indicate that the risk for other credit institutions have increased during the period. This contradicts the results from the macro-economic analysis which show that European financial institutions have become less risky than the market during the period.

9.3.3 Market Risk exposure analysis

For the market risk exposure, there are comparable numbers only for Swedbank, SHB and Nordea.

Common for the three banks is that the market risk exposure constitutes mainly of interest rate risk and currency risk as can be seen in the figure below.

Figure 25: Capital requirements, market risk



The total market risk exposure (excluding the Stressed VaR) has been reduced for all three banks during the five-year period. It is difficult to assess the elements of the changes in market risk exposure as the market risk assessment is a complicated process which relies on a significant amount of factors. The calculations of market risk exposures are based on historical values and consider the future losses to a certain level of confidence as a

result of changes in risk factors. As can be seen in the macro-analysis from the STIBOR-repo spread, the volatility on the financial markets was high in 2011 and 2012 and small in 2014. All else equal this should mean that the market risk exposure should be smaller in 2014 than in 2011. This is true for Swedbank when excluding the Stressed Var measure but not for SHB and Nordea. As stated in the section regarding risk management for market risk, these incoherent results indicate that market risk is managed in different strategic ways by the banks and the external factors are not affecting the banks in the same uniform way as for the credit exposure. As a result, the market risk might have a smaller effect on systemic risk as there are less uniform developments for the (three) SIFIs analyzed. The fact that the market risk exposure accounts for such a small fraction of the total risk exposure also reduces its significance for the systemic risk.

The developments in the market prices and their uniform impact on financial institutions during the financial crisis were one of the factors that amplified the severance of the crisis. In fact, the Stressed VaR was developed to address this by adding an extra buffer on top of the other market risk exposure categories. Isolated, the buffer makes the banks able to absorb larger losses in the case of a financial distress and hence, makes the banks more robust. The stressed VaR was implemented in 2011. The same year, both Swedbank and Nordea decreased their total market risk exposure significantly. As the volatilities in the financial markets increased in 2011, this might be an indication that the Stressed VaR has had a positive effect on the banks risk taking in terms of market risk. However, also SHB, which is not affected by the stressed VaR, reduced its market risk exposure this year. Hence, it is difficult to conclude that the stressed VaR would reduce the market risk taken.

As stated in the methodology section, a more thorough analysis is needed to further assess the market risk. The author refers to the scope of the thesis.

9.3.4 Liqudity risk analysis

The available data for the components driving the LCR are reported for 2013 and 2014 for Swedbank, SHB and Nordea. The liquidity risk does not affect the REA but is nevertheless an indicator of risk.

Figure 26: LCR

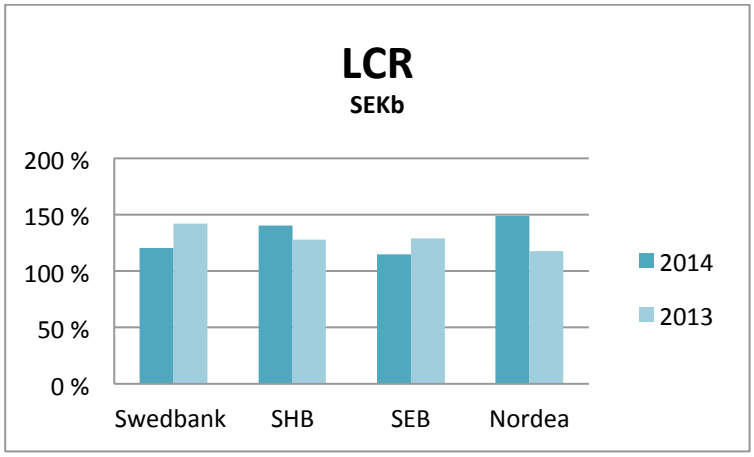
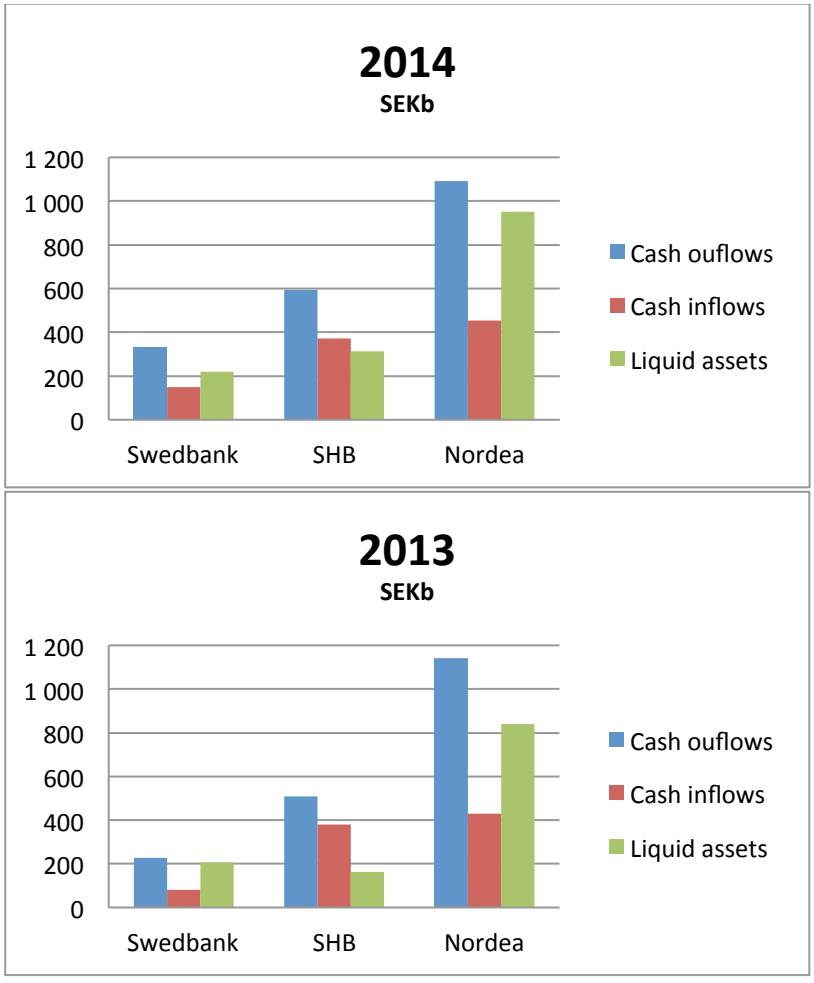


Figure 27:Components of LCR



Source: Conducted by author. See appendix 7.

In total, all four banks hold sufficient LCR-ratios during both years despite differing strategies. The fact that the banks need to disclose the LCR-ratio in 2013 and 2014 according to the CRR/CRD IV may isolated decrease the markets perception of risk. This is however difficult to quantify.

The improved macro-economic situation during the period analyzed should indicate lower liquidity risk. The decreased interbank lending rates should decrease the alternative cost of holding liquid assets. Everything else equal, the banks should hold more liquid assets in 2014 than in 2013 due to these external factors, which is indeed the case.

Changes in internal factors may be attributable to the credit risk. From the credit risk analysis we can see that all banks have increased total EAD in 2014. Isolated this would increase the cash outflows which is indeed the case for Swedbank and SHB. However, Nordea has decreased their cash outflows despite the expansion in lending.

It is somewhat difficult to assess the liquidity risk with data for only two years available. In addition, because liquidity risk is subject to rapid changes due to the banks day-to day operations, an analysis of balance sheet numbers is insufficient. The banks liquidity management is future-oriented and based on stress tests. However, it seems like no large fluctuations have occurred and hence, the decline in the risk perceived by the market is probably not due to liquidity risk.

9.4 Partly conclusion from the financial analysis

The capital ratios have increased during the period for all four banks. The increases are driven both by increases in capital held and by decreases in REA. The largest part of the decreases in REA is attributable to Credit REA.

The reduction in Credit REA stems mainly from reduction in Corporate Credit RW calculated by the IRB-method. The decrease is partly due to external factors.

The results from the market risk analysis is hard to interpret and it becomes difficult to say whether the banks have become more robust due to external factors or because of a different risk management strategy. However, as the total market risk as been fairly stable between the years, the changes in the perceptions of risk is probably not attributable to changes in the management of market risk..

In total, all four banks hold sufficient LCR-ratios during both years. Due to external factors, the liquidity risk should be lower through the period. However, because of the limited scope, the effects are difficult to quantify.

10 Discussion

The discussion is based on the author's own considerations of how the results and the theory relates to expectations and the problem statement. More specific, the author discusses whether the results from the analysis fit with existing theory and previous research. The aim is to obtain an understanding of whether changes in risk, both perceived by the market and from the analyses, can be attributable to the CRR/CRD IV.

The results from the analysis of capital ratios and the markets perception of risk indicate that all four Swedish SIFIs have become more robust during the period between 2010 and 2014.

The CDS-spreads in figure 15 show decreasing risk premiums during the period for all Swedish SIFIs. According to Longstaff et al (2005), the CDS-spread is a superior measure of credit risk. Hence, under the assumption of efficient markets, the author argues that the decreased CDS-spreads during the whole period indicate decreased risk for the four Swedish SIFIs. The decreased risk premium in the interbank market visible through the smaller STIBOR-repo spread is another indication of perceived lower risk by the market. Both measures show that the largest decrease occurred in 2012.

All four banks have increased their CET1 capital ratios from an average of 12,6% in 2010 to 18,4% in 2014, implying an increase in the banks' ability to absorb losses with capital of the highest quality of 5,9 percentage points. The Total Capital Ratio has increased from on average 16,6% in 2010 to 23,5% in 2014, implying an increase in total loss absorbing capacity of 6,9 percentage points. According to the report by Sveriges Riksbank (2014), higher capital reduces the probability of default in a stressed situation. According to Archaraya & Richardson (2009) one of the main problems during the financial crisis was the insufficient loss-absorbing capacity and the regulation of CRR/CRD IV was supposed to address this issue. The coinciding decreases in risk premiums and higher capital ratios might be an indication that the increased robustness is a consequence of the new regulation of CRR/CRD IV.

Another result that is backing up under the reasoning regarding that banks have become more robust as a consequence of the CRR/CRD IV is the spread between European Financials and the general market. The spread

shows that European financial institutions have become less risky than the general European market and hence, there is reason to believe that there are some risk-mitigating factors that only apply to financial institutions. The decreased spread coincides with the first year of implementation (2014) of stricter capital requirements for both the Total Capital Ratio and the CET1-ratio. However, the author is not able to prove causality in a statistical significant manner.

There are some additional elements which are harder to quantify but might nevertheless contribute to the markets perception of decreased risk. Firstly, higher capital ratios should mitigate the moral hazard problem as the shareholders need to bear a larger share of the costs of excessive risk taking. Hence, the probability of the banks ending up in a distressed situation should be lower with higher equity. Secondly, the disclosure requirement itself might decrease the perception of risk, with one example being the decreased possibility to hide assets outside the balance sheet. Hence, both these arguments supports that the banks' effort to circumvent the capital adequacy requirements that Archaraya & Richardson (2009) argue were one of the crucial explanations of the financial crisis, is smaller.

The result of more robust banks as a consequence of the higher capital ratios is not surprising. The regulation itself gives little room for discretion in terms of minimum requirements or disclosure methods. The author encourages the reader to keep in mind that there are two main methods that the banks can use to improve the capital ratios: They can either decrease the Risk Exposure Amount or increase the own funds. Recall table four from the financial analysis.

The table reveals that changes in capital ratios in the years prior 2014 are mainly attributable to decreases in REA while in 2014, the changes were mainly due to increases in capital held for Swedbank, SHB and SEB. From the financial analysis the author concluded that the largest part of the Total REA is constituted by exposures related to credit risk. Moreover, the decreases in credit REA were mainly driven by decreases in RWs. Recall table five.

In the risk section, the author established that RWs are calculated by the banks themselves through the IRB-methods. The author also established that the total credit REA constitutes mainly by REA related to corporate exposures. In the risk section, the author established that the RWs reflect the underlying risk, which relates partly to the PD-rates. In economic downturns, the PD-rates should increase if corporations and retail costumers are starting to default on their loans and this in turn should increase RWs. However, according to the theory regarding the transmission mechanism, the effect might be mitigated by the expansive monetary

policy. Another result which points in this direction is the decrease in RWs despite unfavorable macro-economic situations in 2011 and 2012. The strategic analysis reveals that the four SIFIs have similar operations. Hence, macro-economic factors should affect their RWs simultaneously and in the same direction. This is further supported by Bennett (1984) which states that common factors affect borrowers. However, the author cannot statistically confirm the level of correlation between RWs. To be able to do that, RWs would have to be analyzed over a longer time-period. The author motivates the exclusion of such an analysis with reference to the scope and the purpose of the thesis. However, the author can show that the RWs are moving together in the data which shows the same trend for retail, corporate and institutional RW´s for all banks through the period. Recall figure 24 and table 6.

The positive and supposedly high correlation between the banks' RWs might increase the systemic risk in a stressed situation. An expansion of non-risk-weighted assets (EAD) is unproblematic under normal cirumstances. However, in a stressed situation, for example an economic downturn, the PD-rates should increase, everything else equal. Even if the EAD is stable it is multiplied with higher RWs and this increases total REA. If the banks simultaneously need to increase the own funds due to large increases in REA in a stressed situation to match the capital requirements, this might challenge the profitability of the banks. The lower profitability will in turn decrease the confidence from the public and from the financial markets which might increase the risk premiums for the banks.

From the macro-economic section, it became evident that the vulnerability in the financial system in Sweden is particularly high compared to other countries. Because of their high dependency on market financing stated by Finansinspektionen (2013), a distressed situation with increased risk premiums in the interbank market might affect the liquidity risk in a negative way. Moreover, there is a risk that the effect on Swedish economy of an economic downturn in for example the Eurozone is amplified by the fact that the Swedish exports of the GDP is large compared to other countries. An economic downturn may reduce consumption and affect the housing market in a negative way. This may amplify the risk for the banking system as Swedish financial institutions have large exposures to the housing market (Finansinpektionen, 2014). As Swedish banking system accounts for such a large share of the GDP, this might further aggravate the economic downturn.

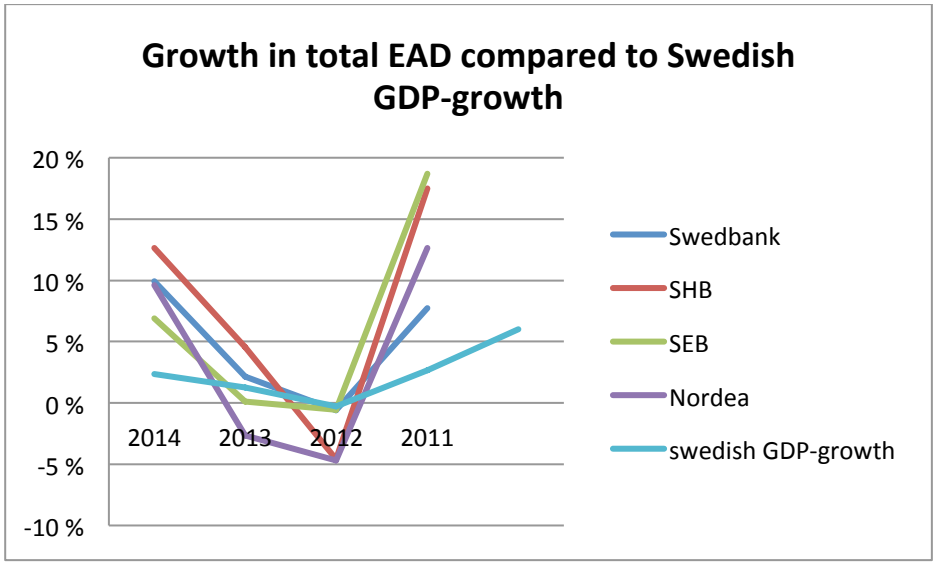
However, the Swedish Financial supervisors and authorities have indeed implemented measures to mitigate the systemic risk. Both the stressed VaR, the Basel 1 floor and the countercyclical capital buffer are all mechanisms that are established to address these problems. In addition, the CRR/CRD IV states that the PD-

calculations are adjusted with conservative margins. The question remains however whether they are sufficient.

In light of the findings and the theory, the author argues that the results might indicate an understatement of risk in the years prior the first period of implementation of the capital requirements under CRR/CRD IV. The increase in institutional RW despite the loss-mitigating activities for this exposure class for all four banks during the period supports this reasoning. The argument also has theorietical support by the difficulties of applying portfolio theory to loan portfolios due to bank loans being non-tradeable. Moreover, as stated by Henry and Kok, (2013), there are limitations to stress tests and the financial crisis revealed the shortcomings in the markets ability to correctly assess the credit risk for financial institutions.

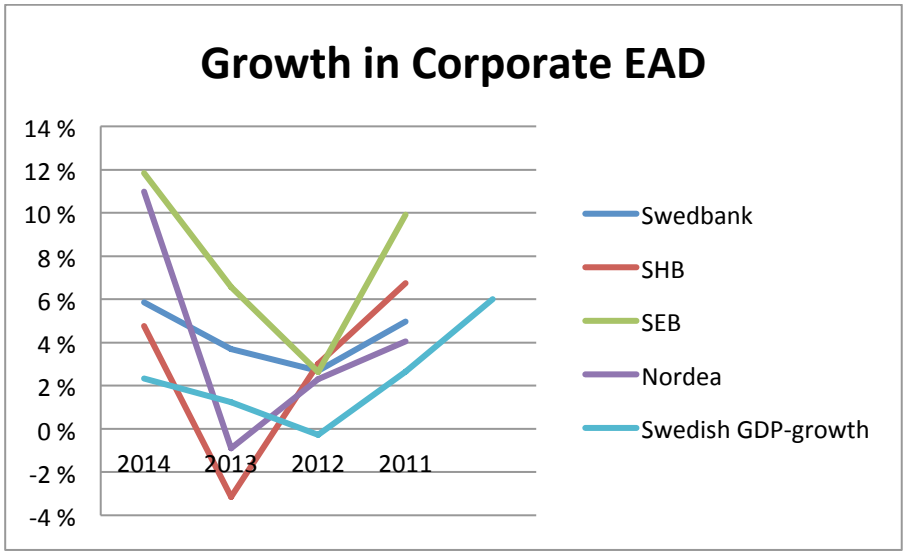
A relevant aspect for the systematic risk assessment is the optimal level of growth in EAD. The financial authorities stresses the importance of the maintained lending function during distressed times to mitigate the negative macro-economic effects. However, according to Arner (2009), one of the main causes to the financial crisis was that assets grew at a far higher rate than the regulatory assessment of risk. Even though this issue has been addressed in the CRR/CRD IV by for example the reporting of off-balance sheet assets in the Pillar 3 and the implementation of the counter-cyclical buffer, the growth in non-risk weighted assets were growing at a faster rate than the Swedish GDP in favorable economic situations during the period of analysis.

Figure 28: Growth in EAD and Swedish GDP



Source: Conducted by author. See appendix 6a-6e.

Figure 29: Growth in Corporate EAD



Source: Conducted by author. See appendix 6a-6e.

If the gap between the expansion of EAD and the growth in GDP continues for many consecutive periods, for example during periods of favourable economic developments, this might create artificial market prices in for example housing. Considering the high debt ratios for Swedish households, a burst of a housing bubble may create serious distortions for the overall economy and hence, increase the systematic risk. The net effect on the banks risk and hence the systemic risk is difficult to quantify and requires further research.

By examining the macro-economic analysis it is easy to see the pattern of the countercyclical monetary policy. During periods of unfavourable macro-economic developments, the monetary policy is expansive. Because interbank lending is directly linked to the repo-rate, the effect on the banks is that the macro-economic impact which affects the banks' credit risk in a negative manner is partly offset by the positive effect that monetary policy has on market- and liquidity risk. The theory as well as the macro-economic analysis supports the positive effects of expansive monetaty policy on market interest rates. It is visible in the analysis through the STIBOR-repo spread which has been low and stable in 2013 and 2014 which was a period with low CDS-spreads. However, with interest rates approaching negative values, constraints may mitigate the desired effect of the monetary policy in the same way as in the aftermath of the financial crisis described in the report by Elmér et al. (2012) and

Altough the Swedish Central Bank´s response to the financial crisis by the fixed-rate loans were not using tax-payers money directly, the effect for the banks is similar as for a government bailout. The banks may be able to anticipate the lower funding costs during distressed times and engage in excessive risk taking (Gambacorta, 2009). It may be compared with how the the excessive risk taking due to the TBTF-problem spurred the financial crisis. This is supported through the theory regarding the society´s dependency on financial institutions and the rationale for intervention by authorities. In addition, the evidence presented by Gambacorta (2009) which shows that low interest rates over an extended period causes an increase in banks' risk-taking further support the argument. However, whether it applies to Swedish banks cannot be concluded. As argued by Borio & Zhu (2012), the research regarding the transmission mechanism and its effect on the financial system through the risk-taking channel is important for policymakers and requires more research.

One result that seems to contradict the assumption regarding the banks' desire to hold as little capital as possible in the pursuit of maximizing shareholder value can be seen in figure 2 where all four banks hold an extra buffer in 2014. However, the higher capital held may be due to strategic reasons. For example, it might be explained by the desire to expand their business in consecutive periods and therefore be ahead of the regulation for strategic reasons. Another explanation for the banks maintaining higher capital ratios than necessary might be to be able to obtain cheaper external financing. This can be supported in the strategic analysis as the banks are all mentioning the new requirements already in 2010 (2012 for SHB).

The sections above illustrate the difficulties that policy makers face when attempting to make the financial system more resilient. Although the CRR/CRD IV is implemented in accordance with national law, the efficiency of the concept of the single rule book is difficult to quantify and assess. This is mainly due to financial systems being very different but nevertheless highly integrated.

11 Conclusion

The financial crisis of 2008 is considered by many economists as being the most severe economic crisis since the great depression. It almost led the financial system to a total collapse and the macro-economic effects were felt long after. It soon became evident that a large part of the cause was attributable to the robustness of financial institutions. In particular, the issues were related to inadequate capital held by banks. The prevalent regulation proved to be insufficient in the protection against severe disruptions of the financial system, and hence to the society as a whole. To address the problem, Basel III and the CRR/CRD IV were developed in 2010 with the first year of implementation in 2014. The overarching goal was to strengthen the resilience in the banking sector.

The author have investigated how the new regulation applies in a country which is characterized by a high concentration ratio in the financial system as well as a high dependence of both the macro-economic situation in the euro-area and of the international financial markets. To investigate the problem, the following research question was developed:

”Have the four Swedish SIFIs become more robust as a result of the CRR/CRD IV?”

By answering the research question, the author seeks to shed light on the issues related to the society´s dependence on financial institutions and how this relate to risk and capital management for the banks. In this way, the author is able to discuss policy implications and make proposals for further research.

The improved capital ratios indicate that the four Swedish SIFIs are more robust in terms of loss absorbing capacity in 2010 than in 2014. The total loss absorbing capacity has increased with an average of 6,9 percentage points and the CET1-ratio has increased with an average of 5,9 percentage points. The market perceives the banks as less risky and this is visible through the CDS-spreads with the largest decrease occurring in 2012.

The results from the analysis of the components of the capital ratios indicate that the increased robustness stem from changes in both external factors as well as increases in capital held. 2014 is the first year that increases in capital ratios are mainly due to more capital held. As this was the first year of implementation of the CRR/CRD IV, this might be an indication that it is the result of the new regulation. In 2014, the European

banking sector is perceived as more resilient compared to the general market while however the individual CDS-spreads for the four Swedish SIFIs show differing results. The increased capital ratios in the years prior 2014 were built mainly by low levels of REA and not by large holdings of capital. This is also the case for Nordea in 2014. The low levels of REA were driven by decreased RWs, which the results show is partly due to external factors, and hence not only by changes in strategic risk mitigating mechanisms. There are no empirical results showing what indirect implications the lower risk perceived in 2012 has had on the access to funding and hence the market and liquidity risk in 2014. The low risk premiums in the interbank market together with the record low levels of federal funds rate indicate however that some of the risk reduction might be a consequence of the transmission mechanism of monetary policy.

The answer to the research question is that the reduction in risk in 2014 compared to 2010 is only partly attributable to the CRR/CRD IV.

The finding of the RWs possible importance for systemic risk through its impact on the REA-levels stresses the importance of an assessment of the possible associated consequences for the financial system during a stressed situation. This is particularly important to Sweden because of the high debt ratio for households and hence, the possible simultaneous increases in default rates.

The author is also emphasizing the need to further investigate the implication of how the transmission mechanism of monetary policy through the risk-taking channel affects the risk and capital management for the Swedish SIFIs. The results and the theory indicate that the moral hazard problem with excessive risk taking might only be partly responsive to the regulation. This is supported by the significance of the four SIFIs for the Swedish financial system visible through their large market share. The long period with low interest rates further motivates the need for research on the risk perception and pricing of risk for economic agents.

The CRR/CRD IV needs a thorough evaluation after the implementation period is finished to conclude whether the regulation has filled its purpose. The author has hoped to be able to highlight some of the issues observable in the preliminary implementation which may be useful for policy makers in the full assessment of the CRR/CRD IV after the implementation is finished in 2019.

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Appendices

Appendix 1: Criteria for capital instruments

Article 28 of the CRR states that capital instrument can only qualify as Common Equity Tier 1 instruments if a number of conditions are met. These can be summarised for joint-stock companies as follows (some special provisions apply for mutual, cooperatives, savings banks and similar institutions):

- they are issued directly by the institution;
- they are paid up and their purchase is not funded by the institution;
- they meet a number of conditions as regards their classification (e.g. they qualify as capital for accounting and insolvency purposes);
- they are clearly and separately disclosed on institutions' financial statements balance sheet;
- they are perpetual;
- the principal amount of the instruments may not be reduced or repaid unless the institution is e.g. liquidated. Moreover, the provisions governing the instruments should not indicate that the principal amount of the instruments would or might be reduced or repaid other than in the liquidation of the institution;
- the instruments meet a number of conditions as regards distributions (e.g. no preferential distributions in time, distributions may be paid only out of distributable items, the conditions governing the instruments do not include a cap or other restriction on the maximum level of distributions, the level of distributions is not determined on the basis of the amount for which the instruments were purchased, etc…);
- compared to all the capital instruments issued by the institution, the instruments absorb the first and proportionately greatest share of losses as they occur, and each instrument absorbs losses to the same degree as all other Common Equity Tier 1 instruments;
- the instruments rank below all other claims in the event of insolvency or liquidation of the institution;
- the instruments entitle their owners to a claim on the residual assets of the institution, which, in the event of its liquidation and after the payment of all senior claims, is proportionate to the amount of such instruments issued and is not fixed or subject to a cap;
- the instruments are not secured, or guaranteed by any entity in the group (e.g. the institution, its subsidiaries, the parent institution or its subsidiaries, etc);
- the instruments are not subject to any arrangement that enhances the seniority of claims under the instruments in insolvency or liquidation.

These conditions ensure that only the highest quality capital instruments qualify as CET1.

Appendix 2: CDS indices

Category	Name in Datastream	Weight
Banks	DS EUROPE BANKING 5Y CDS INDEX (E) - CDS PREM. MID	
Consumer Goods	DS EUROPE CSM GOODS 5Y CDS INDEX (E) - CDS PREM. MID	0,125
Manufacturing	DS EUROPE MNFG 5Y CDS INDEX (E) - CDS PREM. MID	0,125
Electric power	DS EUROPE ELEC POW 5Y CDS INDEX (E) - CDS PREM. MID	0,125
Services	DS EUROPE SERVICE CO 5Y CDS INDEX (E) - CDS PREM. MID	0,125
Telephone	DS EUROPE TELEPHONE 5Y CDS INDEX (E) - CDS PREM. MID	0,125
Energy	DS EUROPE ENERGY CO 5Y CDS INDEX (E) - CDS PREM. MID	0,125
Sovereign	DS EUROPE SOVEREIGN 5Y CDS INDEX (E) - CDS PREM. MID	0,125
Transport	DS EUROPE TRSP 5Y CDS INDEX (E) - CDS PREM. MID	0,125
	TOT	1

Appendix 3: CDS-spreads and Capital ratios

CDS-spread

year	Swedbank	SHB	SEB	Nordea
2014	56.950		50.940	65.410
2013	84.835		76.465	54.105
2012	108.300	74.547	104.350	79.375
2011	214.845	159.005	214.575	163.370
2010	90.860	56.210	87.550	78.920
2009	121.540	57.473	120.440	56.860

End-of-year numbers

CET1 capital ratio (excluding Basel 1 floor)

year	Swedbank	SHB	SEB	Nordea	Average
2014	21,2%	20,4%	16,3%	15,7%	18,4%
2013	18,3%	18,9%	15,0%	14,9%	
2012	17,4%	18,4%	15,1%	13,1%	
2011	15,7%	15,6%	13,7%	11,2%	
2010	13,9%	13,8%	12,2%	10,3%	12,6%
			Change in period		5,9%

Total capital ratio (excluding Basel 1 floor)

year	**Swedbank**	**SHB**	**SEB**	**Nordea**	Average
2014	25,5%	25,6%	22,2%	20,7%	23,5%
2013	20,7%	21,6%	18,1%	18,1%	
2012	19,6%	20,9%	17,2%	16,2%	
2011	18,9%	20,9%	15,2%	13,4%	
2010	18,4%	20,9%	13,8%	13,4%	16,6%
			Change in period		6,9%

Appendix 4: Capital requirements

	2014	2013		2012		2011		2010	
	Basel 3	Basel 2	Basel 3*	Basel 2		Basel 2		Basel 2	Basel 2
				including transition rules	excluding transition rules	including transition rules	excluding transition rules	including transition rules	excluding transition rules
Swedbank (SEKm)									
Risk Exposure Amount	414 214	451 931	440 620	769 117	464 339	756 762	492 337	750.440	541.327
CET1 capital	87 916	84 606	80 826	80 697	80 697	77 302	77 302		
Tier 1 capital	92 914	88 615	86 371	86 967	86 967	84 855	84 855		
Total capital	105 588	90 772	91 026	91 155	91 155	93 173	93 173	99.687	99.687
CET1 capital ratio (excluding Basel I floor)	21,2%	18,7%	18,3%	10,5%	17,4%	10,2%	15,7%	10%	14%
Tier 1 capital ratio (excluding Basel I floor)	22,4%	19,6%	19,6%	11,3%	18,7%	11,2%	17,2%	11%	15%
Total capital ratio (excluding Basel I floor)	25,5%	20,1%	20,7%	11,9%	19,6%	12,3%	18,9%	13%	18%
Capital requirement	33137	36154	35250	61529	37147	60541	39387	60035	43306
Quotient	3,19	2,51	2,58	1,48	2,45	1,54	2,37	1,66	2,30
SHB (SEKm)									
REA (excluding Basel I floor)	480.388,00	465.701,00	492.785,00	1.006.219,00	488.400,00	988.180,00	508.317,00	953.561,00	532.136,00
CET1 capital	98.084,00	89.535,00	93.136,37	90.559,71	89.865,60	79.054,40	79.297,45	73.424,20	73.434,77
Tier 1 capital	106.127,00	100.137,00	103.484,85	102.634,34	102.564,00	93.877,10	93.530,33	87.727,61	87.802,44
Total Own funds	122.858,00	100.406,00	106.441,56	101.628,12	102.075,60	105.735,26	106.238,25	110.613,08	111.216,42
CET1 capital ratio (excluding Basel I floor)	20,4%	19,2%	18,9%	9,0%	18,4%	8,0%	15,6%	8%	14%
Tier 1 capital ratio (excluding Basel I floor)	22,1%	21,5%	21,0%	10,2%	21,0%	9,5%	18,4%	9%	17%
Total capital ratio (excluding Basel I floor)	25,6%	21,6%	21,6%	10,1%	20,9%	10,7%	20,9%	12%	21%
Capital requirement	38.431,04	37.256,08	39.422,80	80.497,52	39.072,00	79.054,40	40.665,36	76.284,88	42.570,88
Quotient	3,20	2,70	2,70	1,26	2,61	1,34	2,61	1,45	2,61

	2014	2013		2012		2011		2010	
	Basel 3	Basel 2	Basel 3*	Basel 2		Basel 2		Basel 2	Basel 2
				including transition rules	excluding transition rules	including transition rules	excluding transition rules	including transition rules	excluding transition rules
SEB (SEKm)									
REA (excluding Basel I floor)	616.531,0	598.324,0		879237	585.839,0	827615	678.841,0	799798	716126
CET1 capital	100.569,0	89.826,0		88.389,0	88.389,0	93097	93097	87387	87387
Tier 1 capital	120.317,0	102.462,0		102.393,0	102.393,0	107711	107711	101980	101980
Total Own funds	136.899,0	108.260,0		100.867,0	100.867,0	103445	103445	99149	99149
CET1 capital ratio (excluding Basel I floor)	16,3%	15,0%		10,1%	15,1%	11,2%	13,7%	10,9%	12,2%
Tier 1 capital ratio (excluding Basel I floor)	19,5%	17,1%		11,6%	17,5%	13,0%	15,9%	12,8%	14,2%
Total capital ratio (excluding Basel I floor)	22,2%	18,1%		11,5%	17,2%	12,5%	15,2%	12,4%	13,8%
Capital requirement	49322	47866		70339	46867	66209	54307	63984	57290
Quotient	2,78	2,26		1,43	2,15	1,56	1,90	1,55	1,73
Nordea (EURbn)									
REA (excluding Basel I floor)	145,5	155,3		214,5	167,9	223,8	185,2	214,8	185,1
CET1 capital	22,8	23,1		22	22,0	20,7	20,7	19,1	
Tier 1 capital	25,6	24,4		24	24,0	22,6	22,6	21	
Total own capital	30,0	28,0		27,3	27,3	24,8	24,8	24,7	
CET1 capital ratio (excluding Basel I floor)	15,7%	14,9%		10,2	13,1%	9,2%	11%	8,9	10%
Tier 1 capital ratio (excluding Basel I floor)	17,6%	15,7%		11,2	14,3%	10,1%	12%	9,8	11%
Total capital ratio (excluding Basel I floor)	20,7%	18,1%		12,7	16,2%	11,1%	13%	11,5	13%
Capital requirement	11,64	12,424		17,16	13,432	17,904	14,816	17,184	14,808
Quotient	2,6	2,3		1,6	2,0	1,4	1,7	1,4	0,0

Appendix 5: Conversion from EUR to SEK for Nordea

Change in capital ratios EUR	**2014**	**2013**	**2012**	**2011**
CET1 capital ratio (excluding Basel I floor)	5,4%	13,7%	17,0%	8,7%
REA (excluding Basel I floor)	-6,3%	-7,5%	-9,3%	0,1%
CET1 capital	-1,3%	5,0%	6,3%	
Total capital ratio (excluding Basel I floor)	14,4%	11,7%	20,9%	0,0%
REA (excluding Basel I floor)	-6,3%	-7,5%	-9,3%	0,1%
Total own capital	7,1%	2,6%	10,1%	

year	2014	**2013**	**2012**	**2011**	**2010**
Exchange rate 31/12	9,6234	8,9283	8,582	8,9414	8,9655
REA (SEK)	1400205	1386565	1440918	1655947	1659514

Calculations of changes with REA denominated in SEK

Change (excl. Transitional rules)	**2014**	**2013**	**2012**	**2011**
REA (excluding Basel I floor)	**1,0%**	**-3,8%**	**-13,0%**	**-0,2%**
CET1 capital	-1,3%	5,0%	6,3%	
Tier 1 capital	4,9%	1,7%	6,2%	
Total Own funds	7,1%	2,6%	10,1%	
CET1 capital ratio (excluding Basel I floor)	5,4%	13,7%	17,0%	8,7%
Tier 1 capital ratio (excluding Basel I floor)	12,1%	9,8%	17,2%	7,0%
Total capital ratio (excluding Basel I floor)	14,4%	11,7%	20,9%	0,0%

Appendix 6a: Credit risk
Swedbank

Key parameters by risk category as of 31 December 2014					
SEKm	2014	2013	2012	2011	2010
Retail - mortgages					
Exposure, in SEKm	839.420	825.644	794.944	777.817	762.665
Exposure weighted average PD, in %	0,87	0,97	0,54	1,41	1,40
Exposure weighted average LGD, in %	10,76	10,11	10,42	10,74	10,88
Average RW, in %	5,96	5,93	6,64	7,15	7,15
Expected loss, in SEKm	1.312	1.570	2.168	2.634	
Retail - other					
Exposure, in SEKm	92.464	71.350	73.363	77.859	83.158
Exposure weighted average PD, in %	2,58	3,65	2,15	4,61	4,90
Exposure weighted average LGD, in %	37,55	42,27	42,49	42,93	43,02
Average RW, in %	28,52	40,47	40,42	40,71	40,58
Expected loss, in SEKm	999	1.173	1.348	1.773	
Corporate - Advanced IRB					
Exposure, in SEKm	385.375		418.677	407.753	388.427
Exposure weighted average PD, in %	0,96		0,99	3,64	5,43
Exposure weighted average LGD, in %	22,25		42,13	42,72	43,40
Average RW, in %	30,57		57,62	63,49	74,67
Expected loss, in SEKm	929		4.158	6.524	
Corporate - Foundation IRB					
Exposure, in SEKm	74.135	434.151			
Exposure weighted average PD, in %	3,84	1,60			
Exposure weighted average LGD, in %	43,54	41,88			
Average RW, in %	67,70	56,29			
Expected loss, in SEKm	1.264	3.018			
Corporate - specialised lending					
Exposure, in SEKm	2.057	2.225	3.105	5.986	9343
Average RW, in %	106,4	113,35	96,75	109,15	79,77
Expected loss, in SEKm	310	423	792	1.690	3060
Institutions					
Exposure, in SEKm	136.263	121.698	147.467	131.337	146.519
Exposure weighted average PD, in %	0,15	0,14	0,12	0,29	0,28
Exposure weighted average LGD, in %	21,71	24,88	26,27	26,28	29,50
Average RW, in %	15,28	13,29	14,89	12,92	13,90

Expected loss, in SEKm	76	66	98	164	
Other IRB exposure classes					
Exposure in SEKm	75.841	12.830	15.115	19.324	28.958
Average RW in %	9,83	74,97	76,91	82,64	77,07
Total IRB approach					
Exposure, in SEKm	1.605.555	1.467.898	1.452.671	1.420.075	1.409.727
Exposure weighted average PD, in %	1,08	1,22	0,71	2,14	2,62
Exposure weighted average LGD, in %	17,86	22,45	22,96	23,29	23,85
Average RW, in %	17,12	23,88	24,80	27,15	29,86
Expected loss, in SEKm	4.889	6.250	8.564	12.784	
Standardized approach					
Exposure in SEKm	286.227	253.028	231.739	274.535	163.413
Average RW in %	18,76	9,56	12,28	11,05	20,83
Total exposures					
Exposure in SEKm	1.891.783	1.720.926	1.684.409	1.694.609	1.573.140
Average RW in %	17,37	21,77	23,08	28,92	28,92

Note: Exposures according to the capital adequacy framework, IRB approach exposures defined as EAD.

EAD	**2014**	**2013**	**2012**	**2011**	**2010**	Change
IRB						
Retail-mortgages	839.420	825.644	794.944	777.817	762.665	10,1%
Retail other	92.464	71.350	73.363	77.859	83.158	11,2%
Corporate	459.510	434.151	418.677	407.753	388.427	18,3%
Corporate specialized lending	2.057	2.225	3.105	5.986	9.343	-78,0%
Institutions	136.263	121.698	147.467	131.337	146.519	-7,0%
Other	75.841	12.830	15.115	19.324	28.958	161,9%
Standardized	286.227	253.028	231.739	274.535	163.413	75,2%
Total	**1.891.783**	**1.720.926**	**1.684.409**	**1.694.609**	**1.573.140**	**20,3%**

Average RW in %	**2014**	**2013**	**2012**	**2011**	**2010**	
IRB						
Retail-mortgages	5,96	5,93	6,64	7,15	7,15	-16,6%
Retail other	28,52	40,47	40,42	40,71	40,58	-29,7%
Corporate	36,56	56,29	57,62	63,49	74,67	-51,0%
Corporate specialized lending	106,40	113,35	96,75	109,15	79,77	33,4%
Institutions	15,28	13,29	14,89	12,92	13,90	9,9%
Other	9,83	74,97	76,91	82,64	77,07	-87,2%
Standardized	18,76	9,56	12,28	11,05	20,83	-9,9%
Total	**17,37**	**21,77**	**23,08**	**28,92**	**28,92**	**-40,0%**

Capital requirement	2014	2013	2012	2011	2010	
IRB						
Retail-mortgages	4000,681258	3916,855136	4220,243841	4447,439934	4360,613404	-8,3%
Retail other	2109,316865	2310,0276	2372,119119	2535,686318	2699,30868	-21,9%
Corporate	13440,63635	19550,68783	19299,18948	20709,19491	23203,38601	-42,1%
Corporate specialized lending	175,09184	201,763	240,3226548	522,7208512	596,232888	-70,6%
Institutions	1665,813674	1293,893136	1756,678747	1357,096624	1629,52571	2,2%
Other	596,3565007	769,49208	930,0679961	1277,514853	1785,415551	-66,6%
Standardized	4294,594799	1935,158144	2276,446711	2426,89856	2722,455549	57,7%
Total	**26282,52**	**29971,647**	**31095,031**	**39211,904**	**36401,204**	**-27,8%**

REA	2014	2013	2012	2011	2010
IRB					
Retail-mortgages	50008,51572	48960,6892	52753,04801	55592,99918	54507,66755
Retail other	26366,46082	28875,345	29651,48898	31696,07897	33741,3585
Corporate	168007,9544	244383,5979	241239,8685	258864,9363	290042,3252
Corporate specialized lending	2188,648	2522,0375	3004,033185	6534,01064	7452,9111
Institutions	20822,67092	16173,6642	21958,48434	16963,7078	20369,07138
Other	7454,456259	9618,651	11625,84995	15968,93566	22317,69439
Standardized	53682,43498	24189,4768	28455,58389	30336,232	34030,69436
Total	**328531,5**	**374645,59**	**388687,89**	**490148,8**	**455015,05**	**-27,8%**

Exposure weighted average LGD, in %	2014	2013	2012	2011	2010	
IRB						
Retail-mortgages	10,76	10,11	10,42	10,74	10,88	-1,1%
Retail other	37,55	42,27	42,49	42,93	43,02	-12,7%
Corporate	25,68	41,88	42,13	42,72	43,40	-40,8%
Institutions	21,71	24,88	26,27	26,28	29,50	-26,4%

Appendix 6b: Credit risk SHB

Key parameters by risk category as of 31 December 2014

SEKm	2014	2013	2012	2011	2010
Retail					
Exposure amount EAD, in SEKm	867.447	818.080	780.772	760.469	721.415
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %	17,00	17,00	16,00	16,00	16,00
Average RW, in %	8,00	8,00	9,00	8,00	9,00

Expected loss, in SEKm					
Corporate - TOTAL IRB					
Exposure amount EAD, in SEKm	958.861	915.218	944.987	917.480	859.427
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %	28,00	29,00	30,00	32,00	
Average RW, in %	24,00	28,00	30,00	33,00	38,00
Institutions					
Exposure amount EAD, in SEKm	134.409	100.503	128.748	158.538	181.574
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %	15,00	18,00	15,00	19,00	
Average RW, in %	12,00	12,00	9,00	12,00	11,00
Expected loss, in SEKm					
Other IRB exposure classes					
Average Exposure amount, in SEKm					
Average RW in %					
Total IRB approach					
Exposure amount EAD, in SEKm	1.969.327	1.842.576	1863315	1845150	1775645
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %					
Average RW, in %	17,10	19,00	20,00	22,00	23,00
Expected loss, in SEKm					
Standardized approach					
Exposure amount EAD, in SEKm	730.160	553.555	428.159	556.605	268.689
Average RW in %	10,00	11,00	11,00	8,00	19,00
Total exposures					
Exposure amount EAD, in SEKm	2.699.487	2.396.131	2.291.474	2.401.755	2.044.334
Average RW in %	15,00	17,00	19,00	19,00	23,00

EAD	**2014**	**2013**	**2012**	**2011**	**2010**	Change
IRB						
Retail	867.447,00	818.080,00	780.772,00	760.469,00	721.415,00	20,2%
Corporate	958.861,00	915.218,00	944.987,00	917.480,00	859.427,00	11,6%
Corporate specialized lending						
Institutions	134.409,00	100.503,00	128.748,00	158.538,00	181.574,00	-26,0%
Other						
Standardized	730.160,00	553.555,00	428.159,00	556.605,00	268.689,00	171,7%
Total	**2.699.487,00**	**2.396.131,00**	**2.291.474,00**	**2.401.755,00**	**2.044.334,00**	**32,0%**

Average RW in %	2014	2013	2012	2011	2010	
IRB						
Retail	8,00	8,00	9,00	8,00	9,00	-11,1%
Corporate	24,00	28,00	30,00	33,00	38,00	-36,8%
Corporate specialized lending						
Institutions	12,00	12,00	9,00	12,00	11,00	9,1%
Other						
Standardized	10,00	11,00	11,00	8,00	19,00	-47,4%
Total	**15,00**	**17,00**	**19,00**	**19,00**	**23,00**	**-34,8%**

Capital requirement	2014	2013	2012	2011	2010	
IRB						
Retail	5.551,66	5.235,71	5.621,56	4.867,00	5.194,19	6,9%
Corporate	18.410,13	20.500,88	22.679,69	24.221,47	26.126,58	-29,5%
Corporate specialized lending						
Institutions	1.290,33	964,83	926,99	1.521,96	1.597,85	-19,2%
Other						
Standardized	5.841,28	4.871,28	3.767,80	3.562,27	4.084,07	43,0%
Total*with some difference from SHB-expo analysis, -12,9%)	**32.393,84**	**32.587,38**	**34.830,40**	**36.506,68**	**37.615,75**	**-13,9%**

REA (RW*EAD)	2014	2013	2012	2011	2010	
IRB						
Retail	69.395,76	65.446,40	70.269,48	60.837,52	64.927,35	
Corporate	230.126,64	256.261,04	283.496,10	302.768,40	326.582,26	
Corporate specialized lending						
Institutions	16.129,08	12.060,36	11.587,32	19.024,56	19.973,14	
Other						
Standardized	73.016,00	60.891,05	47.097,49	44.528,40	51.050,91	
Total	**404.923,05**	**407.342,27**	**435.380,06**	**456.333,45**	**470.196,82**	**-13,9%**

Exposure weighted average LGD, in %	2014	2013	2012	2011	2010	
IRB						
Retail	17,00	17,00	16,00	16,00	16,00	6,3%
Corporate* From 2011	28,00	29,00	30,00	32,00	0,00	-12,5%
Institutions* From 2011	15,00	18,00	15,00	19,00	0,00	-21,1%

*Equity exposures, non-credit obligation assets and securitization positions are not counted as the exposures account for such a small fraction.
* Largest fraction in Standardized approach has exposures to sovereigns and central bank and this has a risk weight of 0%. *Retail exposures include both to private individuals and small companies, both property lending and other (with property lending to private in
*Retail exposures include both to private individuals and small companies, both property lending and other (with property lending to private individuals as 6/7-parts) dividuals as 6/7-parts)

Appendix 6c: Credit risk SEB

Key parameters by risk category as of 31 December 2014					
SEKm	2014	2013	2012	2011	2010
Retail - mortgages					
Exposure, in SEKm EAD	462.610	436.342	412.360	374.869	387.700
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %	10,70	12,10	12,20	12,80	16,80
Average RW, in %	6,90	9,50	10,40	12,10	16,90
Expected loss, in SEKm					
Retail - other					
Exposure, in SEKm EAD	68.981	46.179	25.065	25.256	25.733
Exposure weighted average PD, in %					
Exposure weighted average LGD, in % (other retail)	44,80	43,50	41,20	40,20	40,80
Average RW, in %	28,90	26,10	37,40	37,50	38,20
Expected loss, in SEKm					
Corporate - Advanced IRB? Large corporates, SME, Specialized lending)					
Exposure, in SEKm EAD	957.562	856.178	803.332	782.735	712.132
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %	27,10	27,00			
Average RW, in %	36,00	38,40	40,70	50,30	56,60
Expected loss, in SEKm					
Institutions					
Exposure, in SEKm	153.729	136.200	169.045	188.713	216.457
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %	44,70	45,80			
Average RW, in %	22,10	22,00	14,10	15,70	17,30
Expected loss, in SEKm					

Other IRB exposure classes (securitization and other)						
Exposure in SEKm	11.576	12.381	14.916	0	0	
Average RW in %	43,50	39,00	0,00	0,00	0,00	
Total IRB approach						
Exposure, in SEKm	1.654.358	1.487.280	1.442.993	1.408.373	1.390.341	
Exposure weighted average PD, in %						
Exposure weighted average LGD, in %						
Average RW, in %	26,30	28	28,40	34,50	37,70	
Expected loss, in SEKm						0,035927
Standardised approach						
Exposure in SEKm	374.497				216.220	
Average RW in %	14,60	14,60				
Total exposures						
Exposure in SEKm	2.028.855	1.898.039			1.606.561	
Average RW in %	24,20	25,10			37,70	

Note: Exposures according to the capital adequacy framework, IRB approach exposures defined as EAD.

EAD	**2014**	**2013**	**2012**	**2011**	**2010**	Change
IRB						
Retail-mortgages	462.610	436.342	412.360	374.869	387.700	19,3%
Retail other	68.981	46.179	25.065	25.256	25.733	168,1%
Corporate	957.562	856.178	803.332	782.735	712.132	34,5%
Corporate specialized lending	0	0	0	0	0	
Institutions	153.729	136.200	169.045	188.713	216.457	-29,0%
Other	11.576	12.381	14.916	36.800	56.562	-79,5%
Standardized	374.497	0	0	0	216.220	73,2%
Total	**2.028.855**	**1.898.039**	**1.896.194**	**1.906.915**	**1.606.561**	**26,3%**

Average RW in %	**2014**	**2013**	**2012**	**2011**	**2010**	
IRB						
Retail-mortgages	6,90	9,50	10,40	12,10	16,90	-59,2%
Retail other	28,90	26,10	37,40	37,50	38,20	-24,3%
Corporate	36,00	38,40	40,70	50,30	56,60	-36,4%
Corporate specialized lending						
Institutions	22,10	22,00	14,10	15,70	17,30	27,7%
Other	43,50	39,00	20,00	22,18	28,61	52,1%
Standardized	14,60	14,60	0,00	0,00	0,00	
Total	**24,20**	**25,10**	**0,00**	**34,50**	**37,70**	**-35,8%**

Capital requirement	2014	2013	2012	2011	2010	0,760994392
IRB						21,61224073
Retail-mortgages	2553,6072	3316,1992	3430,8352	3628,73192	5241,704	-51,3%
Retail other	1594,84072	964,21752	749,9448	757,68	786,40048	102,8%
Corporate	27577,7856	26301,78816	26156,48992	31497,2564	32245,33696	
Corporate specialized lending						
Institutions	2717,92872	2397,12	1906,8276	2370,23528	2995,76488	-9,3%
Other	402,8448	386,2872	238,6434887	653,0464	1294,4624	
Standardized	4374,12496	0	0	0	0	
Total	**39278,633**	**38112,623**		**45120**	**48453,88**	**-18,9%**

REA	2014	2013	2012	2011	2010
IRB					
Retail-mortgages	31920,09	41452,49	42885,44	45359,149	65521,3
Retail other	19935,509	12052,719	9374,31	9471	9830,006
Corporate	344722,32	328772,352	326956,124	393715,705	403066,712
Corporate specialized lending	0	0	0	0	0
Institutions	33974,109	29964	23835,345	29627,941	37447,061
Other	5035,56	4828,59	2983,043609	8163,08	16180,78
Standardized	54676,562	0	0	0	0
Total	**490982,91**	**476407,79**	**68125**	**657885,68**	**605673,5**

Exposure weighted average LGD, in %	2014	2013	2012	2011	2010	
IRB						
Retail-mortgages	10,70	12,10	12,20	12,80	16,80	-36,3%
Retail other	44,80	43,50	41,20	40,20	40,80	9,8%
Corporate	27,10	27,00	28,28	39,30	0,00	
Institutions	44,70	45,80	0,00	0,00	0,00	

Appendix 6d: Credit risk Nordea
EUR

Key parameters by risk category as of 31 December 2014					
EURm	2014	2013	2012	2011	2010
Retail - mortgages					
Exposure, in EURm EAD	131.285	132.174	130.478	124.020	117.166
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %	13,30	12,30	12,30	13,10	13,60
Average RW, in %	8,00	8,00	9,00	10,00	11,00

Retail - other (other and SME)					
Exposure, in EURm EAD	36.155	27.296	30.105	31.005	31.611
Exposure weighted average PD, in %	0,85	0,67	0,73	0,84	35,50
Exposure weighted average LGD, in % (other retail)	31,00	34,60	35,20	40,20	40,80
Average RW, in %	30,50	33,30	33,90	36,70	35,70
Corporate - Advanced IRB?					
Exposure, in EURm EAD	171.841	166.887	175.203	164.365	157.542
Exposure weighted average PD, in %	0,57	0,59	0,62	0,59	
Exposure weighted average LGD, in %	31,50	41,30	40,90	40,90	36,30
Average RW, in %	42,00	51,00	52,00	53,00	57,00
Institutions					
Exposure, in EURm	47.494	41.093	63.852	68.992	53.497
Exposure weighted average PD, in %	0,10	0,10	0,09	0,09	
Exposure weighted average LGD, in %	25,40	22,70	22,20	25,90	26,50
Average RW, in %	20,00	14,00	13,00	16,00	17,00
Other IRB exposure classes (securitization and other)					
Exposure in EURm	2.343	1.533	1.396	1.408	1.722
Average RW in %	100,00	99,00	100,00	100,00	100,00
Total IRB approach					
Exposure, in EURm	389.119	368.983	401.034	389.790	361.538
Exposure weighted average PD, in %					
Exposure weighted average LGD, in %					
Average RW, in %	27,00	30,00	30,00	32,00	35,00
Standardized approach					
Exposure in EURm	98451	110.572	111.557	126.575	95.559
Average RW in %	14,00	16,00	21,00	30,00	41,00
Total exposures					
Exposure in EURm	487.570	479.555	512.591	516.365	457.097
Average RW in %	24,00	27,00	28,00	31,00	36,00

EURm						
EAD	2014	2013	2012	2011	2010	Change
IRB						
Retail-mortgages	131.285	132.174	130.478	124.020	117.166	12,1%
Retail other	36.155	27.296	30.105	31.005	31.611	14,4%
Corporate	171.841	166.887	175.203	164.365	157.542	9,1%
Corporate specialized lending						
Institutions	**47.494**	**41.093**	63.852	68.992	53.497	-11,2%
Other	**2.343**	**1.533**	**1.396**	**1.408**	**1.722**	36,1%
Standardized	**98.451**	**110.572**	111.557	126.575	95.559	3,0%
Total	487.570	479.555	512.591	516.365	457.097	6,7%

Average RW in %	2014	2013	2012	2011	2010	
IRB						
Retail-mortgages	8,00	8,00	9,00	10,00	11,00	-27,3%
Retail other	30,50	33,30	33,90	36,70	35,70	-14,6%
Corporate	42,00	51,00	52,00	53,00	57,00	-26,3%
Corporate specialized lending						
Institutions	**20,00**	**14,00**	13,00	16,00	17,00	17,6%
Other	**100,00**	**99,00**	**100,00**	**100,00**	**100,00**	0,0%
Standardized	14,00	16,00	21,00	30,00	41,00	-65,9%
Total	24,00	27,00	28,00	31,00	36,00	-33,3%

Capital requirement	2014	2013	2012	2011	2010	
IRB						
Retail-mortgages	840,224	845,9136	939,4416	992,16	1031,0608	-18,5%
Retail other	882,182	727,16544	816,4476	910,3068	902,81016	-2,3%
Corporate	5773,8576	6808,9896	7288,4448	6969,076	7183,9152	-19,6%
Corporate specialized lending						
Institutions	**759,904**	**460,2416**	664,0608	883,0976	727,5592	4,4%
Other	**187,44**	**121,4136**	**111,68**	**112,64**	**137,76**	36,1%
Standardized	**1102,6512**	**1415,3216**	1874,1576	3037,8	3134,3352	-64,8%
Total	9361,344	10358,388	11482,038	12805,852	13164,394	-28,9%

REA	2014	2013	2012	2011	2010
IRB					
Retail-mortgages	10502,8	10573,92	11743,02	12402	12888,26
Retail other	11027,275	9089,568	10205,595	11378,835	11285,127
Corporate	72173,22	85112,37	91105,56	87113,45	89798,94
Corporate specialized lending	**0**	**0**	**0**	**0**	**0**

Institutions	**9498,8**	**5753,02**	**8300,76**	**11038,72**	**9094,49**	
Other	**2343**	**1517,67**	1396	1408	1722	
Standardized	13783,14	17691,52	23426,97	37972,5	39179,19	
Total	117016,8	129479,85	143525,48	160073,15	164554,92	-28,9%
Exposure weighted average LGD, in %	2014	2013	2012	2011	2010	
IRB						
Retail-mortgages	13,30	12,30	12,30	13,10	13,60	-2,2%
Retail other	31,00	34,60	35,20	40,20	40,80	-24,0%
Corporate	31,50	41,30	40,90	40,90	36,30	-13,2%
Institutions	25,40	22,70	22,20	25,90	26,50	-4,2%

Appendix 6e: Credit risk Nordea conversion from EUR to SEK

Exchange rates SEK/EUR	
2014	9,6234
2013	8,9283
2012	8,582
2011	8,9414
2010	8,9655

SEK	Reference: ECB					
exchange rate	9,6234	8,9283	8,582	8,9414	8,9655	
EAD	**2014**	**2013**	**2012**	**2011**	**2010**	Change
IRB						
Retail-mortgages	1263408,069	1180089,124	1119762,196	1108912,428	1050451,773	20,3%
Retail other	347934,027	243706,8768	258361,11	277228,107	283408,4205	22,8%
Corporate	1653694,679	1490017,202	1503592,146	1469653,211	1412442,801	17,1%
Corporate specialized lending	0	0	0	0	0	
Institutions	457053,7596	366890,6319	547977,864	616885,0688	479627,3535	-4,7%
Other	22547,6262	13687,0839	11980,472	12589,4912	15438,591	46,0%
Standardized	947433,3534	987219,9876	957382,174	1131757,705	856734,2145	10,6%
Total	4692081,138	4281610,907	4399055,962	4617026,011	4098103,154	**14,5%**

Average RW in %	**2014**	**2013**	**2012**	**2011**	**2010**	
IRB						
Retail-mortgages	8,00	8,00	9,00	10,00	11,00	-27,3%
Retail other	30,50	33,30	33,90	36,70	35,70	-14,6%
Corporate	42,00	51,00	52,00	53,00	57,00	-26,3%
Corporate specialized lending	0,00	0,00	0,00	0,00	0,00	
Institutions	20,00	14,00	13,00	16,00	17,00	17,6%
Other	100,00	99,00	100,00	100,00	100,00	0,0%
Standardized	14,00	16,00	21,00	30,00	41,00	-65,9%
Total	24,00	27,00	28,00	31,00	36,00	**-33,3%**

Capital requirement	**2014**	**2013**	**2012**	**2011**	**2010**	
IRB						
Retail-mortgages	8085,811642	7552,570395	8062,287811	8871,299424	9243,975602	-12,5%
Retail other	8489,590259	6492,351198	7006,753303	8139,417222	8094,144489	4,9%
Corporate	55564,14123	60792,70185	62549,43327	62313,29615	64407,39173	-13,7%
Corporate specialized lending	0	0	0	0	0	
Institutions	7312,860154	4109,175077	5698,969786	7896,128881	6522,932008	12,1%
Other	1803,810096	1084,017045	958,43776	1007,159296	1235,08728	46,0%

Standardized	10611,25356	12636,41584	16084,02052	27162,18492	28100,88224	-62,2%
Total	90087,95785	92482,79558	98538,85355	114502,2451	118025,3708	**-23,7%**

SEK

REA	**2014**	**2013**	**2012**	**2011**	**2010**	
IRB						
Retail-mortgages	101072,6455	94407,12994	100778,5976	110891,2428	115549,695	
Retail other	106119,8782	81154,38997	87584,41629	101742,7153	101176,8061	
Corporate	694551,7653	759908,7731	781867,9159	778916,2018	805092,3966	
Corporate specialized lending	0	0	0	0	0	
Institutions	91410,75192	51364,68847	71237,12232	98701,61101	81536,6501	
Other	22547,6262	13550,21306	11980,472	12589,4912	15438,591	
Standardized	132640,6695	157955,198	201050,2565	339527,3115	351261,0279	
Total	**1126099,5**	**1156034,9**	**1231735,7**	**1431278,1**	**1475317,1**	**-23,7%**

Exposure weighted average LGD, in %	**2014**	**2013**	**2012**	**2011**	**2010**	
IRB						
Retail-mortgages	13,3	12,3	12,3	13,1	13,6	-2%
Retail other	31	34,6	35,2	40,2	40,8	-24%
Corporate	31,5	41,3	40,9	40,9	36,3	-13%
Institutions	25,4	22,7	22,2	25,9	26,5	-4%

Appendix 7: Liquidity coverage ratios according to new Swedish regulation FFFS 2012:6

2014

SEKb	Swedbank	SHB	SEB	Nordea
				9,6234
Liquidity coverage ratio (LCR), Total, %	120%	140%	115%	149%
Liquid assets	219	312,5		950,79
Liquid assets level 1	140	270,4		605,31
Liquid assets level 2	79	42,1		345,48
Cash outflows	331	595		1.091,29
Customer deposits	98	205		343,56
Market borrowing *	193	351		669,79
Other cash outflows**	40	38,8		76,99
Cash inflows	149	372,5		453,26
Inflow from maturing lending to non-financial customers	9	25,4		64,48
Other cash inflow	140	347		389,75
Cash outflows/cash inflows	2,2214765	1,597315		2,407643
Level 1 assets/net outflows	0,77	1,22		0,95
market borrowing/total cash outflows	0,5830816	0,589916		0,613757

2013

SEKb	Swedbank	SHB	SEB	Nordea
				8,9283
Liquidity coverage ratio (LCR), Total, %	142%	128%	129%	118%
Liquid assets	206	162,3		839,26
Liquid assets level 1	132	130,6		580,34
Liquid assets level 2	74	31,8		258,92
Cash outflows	227	507,9		1.142,82
Customer deposits	87	165,3		339,28
Market borrowing *	110	265,6		714,26
Other cash outflows**	30	77		89,28
Cash inflows	82	380,9		428,56
Inflow from maturing lending to non-financial customers	9	22,1		62,50
Other cash inflow	73	358,83		366,06
Cash outflows/cash inflows	2,7682927	1,333421		2,666667
Level 1 assets/net outflows	0,91	1,03		0,81
market borrowing/total cash outflows	0,4845815	0,522938		0,625

Appendix 8: Exchange rates

Exchange rates SEK/EUR	
2014	9,6234
2013	8,9283
2012	8,582
2011	8,9414
2010	8,9655

Reference: ECB (2016b)