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CARs In the Driver's Seat: The Battle Between Capital and Stock Performance

An Empirical Study of the Capital Adequacy Ratios and Stock Returns of Swedish Banks

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Abstract

After the financial crisis of 2008, the Basel Committee on Banking Supervision created the latest Accord for capital requirements: The Basel III Accord. Basel III set higher requirements for both quantity and quality of capital, with the aim to mitigate systemic risk. Previous literature has however shown that high capital requirements have been associated with a lower performance of banks' stock returns.

This thesis will investigate the relationship between banks' capital structure, specifically Capital Adequacy Ratios (CAR), and the stock returns, as well as Beta values, of the four major Swedish banks. The existing literature has researched the correlation between banks' profitability and capital requirements before, which we will use as a foundation, but we found that the specific relationship between CARs and stock returns had not been estimated, as far as we know. We believe that observing this relationship will further the research and discussion on how the Basel III Accord and capital requirements in general affect banks.

We have conducted an empirical analysis by using data on the four major Swedish banks from 2010-2022. Sweden has among the highest capital requirements in the world and has come far in their implementation of Basel III. We applied the Capital Asset Pricing Model (CAPM) for the different four banks and then a panel regression model to estimate the empirical relationship between CAR and Stock Returns, allowing for the CAPM to play a part.

The results we derived show a negative correlation between Capital Adequacy Ratios and Stock Returns. We also found that Capital Adequacy Ratios significantly reduce the Beta Value of stocks.

Abbreviations

Abbreviation	*Definition*
CAR	Capital Adequacy Ratio
CAPM	Capital Asset Pricing Model
BCBS	Basel Committee on Banking Supervision
BIS	Bank of International Settlements
RWA	Risk-Weighted Assets
LCR	Liquidity Coverage Ratio
HQLA	High-Quality Liquid Asset
NSFR	Net Stable Funding Ratio
OLS	Ordinary Least Squares
SMB	Small Minus Big
HML	High Minus Low
ROE	Return on Equity
ROA	Return on Assets
SML	Security Market Line
SEB	Skandinaviska Enskilda Banken
SHB	Svenska Handelsbanken
SWE	Swedbank
NDA	Nordea

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1.0. Introduction

The purpose of this chapter is to identify and give background to the subject in order to motivate our study and hypothesis. It gives a brief background to the Basel Accords and the purpose of our study. The chapter concludes with a brief explanation of our methodology and results.

1.1. Background and Problem Formulation

In 1974 The Basel Committee on Banking Supervision (BCBS) was founded, whose goal was to supervise banks worldwide in order to maintain financial stability and thus, prevent and mitigate the impact of financial crises. The Committee has set requirements and regulations on banks in terms of minimum requirements of capital, supervision, and transparency. During the years the committee has developed three different frameworks: Basel I (1998), Basel II (2004), and Basel III (2010), reinforced by the Bank of International Settlements (BIS). The latest and most stringent Accord, Basel III, was created in response to the financial crisis of 2008 (BIS, 2013, p.7). The crisis served as an example of the vulnerability of banks concerning liquidity risk and demonstrated gaps in the Basel II regulations. The BCBS, therefore, saw a need for a new framework that adjusted for these lacking regulations, and the creation of Basel III began. The main aim of Basel III was to make banks more resilient to liquidity risk by setting a higher minimum of both liquidity level and high-quality capital.

Sweden is one of the countries committed to Basel III and has four major public banks: Handelsbanken, Nordea, Swedbank, and Skandinaviska Enskilda Banken. In 2014 the Swedish Financial Supervisory Authority set additional requirements on capital coverage, mandating banks to increase their capital coverage by 5% over the amount required by Basel III, leading these four banks to have among the world's most stringent capital requirements (Swedish Financial Supervisory Authority, 2014, pp.39-46).

The BCBS and the Basel Accords have been criticized in terms of their effectiveness and whether capital requirements are set too high. Van Roy (2004) criticized the Accords and questioned if the negative effects of capital requirements are larger than the possible stability they provide. Requirements on banks' liquidity and capital ratios have, in some studies (Le, Nasir, & Huynh, 2020), been shown to decrease volatility. However, high capital

requirements have also been associated with lower stock returns. Previous literature analyzes the relationship between capital requirements, such as liquidity requirements, and asset returns. While studies on the relationship between capital requirements and returns have been conducted on various countries' banks and by various methods, we have taken a different approach in this context. The results from previous studies lead us to believe that the specific requirements of Basel III regarding capital adequacy, will have similar correlations with returns. The specific relationship between capital adequacy and stock returns has not, to the best of our knowledge, been previously estimated, and as Swedish banks have such high capital coverage requirements, the results from this study could potentially serve as an indicator of the general correlation between Capital Adequacy Ratios and stock returns.

1.2. Research Questions and Hypotheses

Primary Research Question:

How have Capital Adequacy Ratios affected the Stock Returns of Swedish Banks?

The amount of revenue a bank makes is proportional to the amount of assets that they hold. If you examine this relationship, and condition on the quality of assets, the amount of profit will depend on financing activities. The more capital a bank uses for financing activities, the lower the return on capital will be (Corporate Finance Institute, 2023). In theory, this implies that if a bank has higher capital ratios, it should generate lower returns. However, this is not necessarily obvious. The impact of higher capital requirements is however dependent on the quality of capital. One may speculate that banks with higher capital adequacy may be able to fund more "safe" activities or more activities with higher returns, and then the overall return on equity could potentially be higher. To estimate this relationship, we will be using the Capital Adequacy Ratio (CAR) and examine its association with Stock Returns.

We have constructed the following hypothesis, and given the economic theory on the matter, we expect to reject the null.

$\mathbf{H_0}$	Capital Adequacy Ratios and Stock Returns have a **non-significant** correlation
$\mathbf{H_1}$	Capital Adequacy Ratios and Stock Returns have a **negative** correlation

Secondary Research Question:

How do Capital Ratios affect the Volatility of the Stock Return, relative to that of the entire market?

Based on the theory of the Capital Asset Pricing Model (CAPM), assets that contain a lower risk level generally generate a lower expected return. CAPM, more precisely, tells us that the Beta Value (a measurement of volatility) of a stock should reflect the exposure of the specific stock to market fluctuations, i.e., market risk. Our hypothesis is that if banks have higher capital ratios, they are less exposed to non-diversifiable risks and we, therefore, expect to reject this null as well.

$\mathbf{H_0}$	Capital Adequacy Ratios **do not affect** the Beta Value of the stock
$\mathbf{H_1}$	Capital Adequacy Ratios **reduce** the Beta of the stock

1.3. Methodology

To analyze the subject matter we will conduct an empirical study using data from the four major Swedish banks. We are going to exploit quarterly data from 2010-2022 on bank returns, market returns, and capital ratios that have been collected using data from the Bloomberg Terminal and various financial reports from the banks. First, we estimate the CAPM on each bank using time series data. Secondly, we are going to explore the role of capital ratios on excess returns and their relation to excess returns from the market. We will run a regression analysis using panel data and analyze the implication our results may have on previous literature and theory, and whether the results are in line with our hypothesis or not.

1.4. Preview of Results

The Capital Asset Pricing Model has given us significant results for the observed banks. The Beta Values of the stocks are all significant. The stocks' volatility in comparison to the market differs between the banks, although this difference is not significant. The alphas (constants serving as intercepts) for the banks are all statistically insignificant. There is a positive relationship between market performance and Swedish banks' stock performance. Our main result is that the lagged Capital Adequacy Ratio is negatively correlated with stock

returns for Swedish banks. This implies that banks with higher capital ratios are associated with lower returns in the future. The null hypothesis that Capital Adequacy Ratio and Stock Return have a non-significant correlation is therefore rejected. Our second result is that CAR also affects the relation between stock return and market return, in the sense that increasing CAR will on average decrease the stocks' volatility. The null hypothesis that Capital Adequacy Ratios do not affect Beta Values is also rejected.

2.0. Literature Review

In this section, we discuss previous literature on the matter and how it corresponds to our thesis. We discuss the similarities between our research question and previous papers, and how they have inspired us. Furthermore, we discuss potential gaps in the findings of previous authors and how we intend to contribute to the research.

2.1. Previous Literature

Pelster, Irresberger & Weiß (2016) performed panel regressions on 1 659 banks during the years 1999 - 2012 with banks' log buy-and-hold-returns as the dependent variable and found that higher regulatory capital has different correlations with the performance of banks in financially stable times and times of financial hardship. In non-crisis times, a high level of Tier 1 capital was negatively correlated with the stock performance of the bank, while in times of crisis, the correlation was significantly positive. Dermine (2015) analyzed the Basel III leverage ratio requirements and the probability of bank runs. She found that liquidity requirements significantly decreased the probability of bank runs, supporting the theory of capital requirements having a positive effect on the performance of banks, especially in times of crisis.

Le, Nasir, & Huynh (2020) concluded, while researching the subject, that capital requirements had a negative impact on the performance of banks in Australia and the U.K. Their focus was to derive an optimal level of capital ratio that should produce the highest possible level of performance. The paper performs empirical studies such as Dynamic Ordinary Least Squares (DOLS) and Fully Modified Ordinary Least Squares (FMOLS) to create this model. The results from these regressions concluded that having too much capital can make a bank less profitable, leading to a lower growth rate. While this conclusion is relevant to our research, this "optimal level" of capital ratio is not relevant to our research

questions. Furthermore, their thesis compared Australia and the U.K., which both have lower capital requirements than Sweden and are more interconnected with global macroeconomic events than Swedish banks.

A thesis written by Nedorezova & Maraval (2019) discusses the potential implications of the Basel III liquidity requirements. Assets are defined as liquid when they can be transferred into cash rapidly and without a significant decrease in value, which is why cash and government bonds are good examples of liquid assets. The problem, however, is that they generally generate lower returns (compared to assets with more risk, such as real estate). Thus, forcing banks to reserve a certain amount of their assets in "liquid form" prohibits them from investing in (potentially) more profitable investments. Since internal profitability gives indications for a bank's financial health, it should have a positive relation to the bank's stock price. In their paper, they sampled 28 banks in the Euro Area. They performed a multiple regression analysis on Returns during the time period 2011-2018 with variables such as market return, "Small Minus Big" (SMB), which is the difference between the return of the smallest and largest stock portfolios, and "High Minus Low" (HML), which is a measure that calculates the difference in returns between two types of stock portfolios: those with high book-to-market ratios and those with low book-to-market ratios. They also used a dummy variable to test for the period 2011-2014 (before Basel III was implemented) and 2015-2018 (with Basel III) and a "Deposits-to-Assets ratio". In addition to this, they performed another regression including a Return-on-Assets variable. They found that there exists a reverse relationship between the LCR and stock returns, but also that the implementation of Basel III affected the stock returns negatively.

Both the paper by Le, Nasir, & Huynh (2020) and the paper by Nedorezova & Maraval (2019) analyzed the relationship between capital requirements and bank performances in different ways, concluding similar results. However, their studies were performed during a period prior to the years of financial instability we have seen since 2020. If the conclusions of Pelster, Irresberger & Weiß (2016) hold true, regarding the different effects of capital ratios in different economic states, it is not surprising to see that their results concluded a negative point of view regarding how Basel III impacted the banks' performances.

Basel III has also received backlash in the sense of accusations about the efficiency of the policy, with doubters believing that capital requirements cannot safeguard banks against

shocks. Imad Moosa (2011) argued that Basel III could not protect banks, as it boosts procyclicality. Moosa went as far as calling the intentions of the Basel committee Mission Impossible 2. *"The bottom line is that the banking industry is procyclical, and no-one can change this fact of life. But at least we know what not to do—that is, boosting the procyclical tendencies of the banking industry, which is what Basel II does and what Basel III will also do."* (Moosa, 2011). There are many articles and theses written about the complications and issues with the Basel Accords but since the focus of our thesis is not to discuss the legitimacy of the Basel Accord, it will only be discussed briefly in Chapter 7.2. Understanding the criticism of the Basel Accords is however crucial to understand why, and how, the Accords have changed over time.

There have been studies performed on the Basel regulations and the same four major Swedish banks before. Particularly one Swedish Bachelor's thesis by Anton Ljung (2017) analyzed how capital requirements were correlated with the banks' volatility. The paper found that there was a negative relationship between the implementation of Basel III and volatility, which is not a surprising conclusion given previous empirical studies and economic theory. This thesis supported the theory that capital requirements can decrease volatility. However, the regressions were performed in the years prior to the Covid-19 pandemic, when banks were more stable than they have been in the past few years. Additionally, while Basel III had been formatted, it had barely begun its implementation, and so direct conclusions on the effects of Basel III can be deemed premature.

2.2. Our Contributions

The findings of Pelser, Irresberger, & Weiß (2016) are relevant to our thesis as they provide a point of view that while financial theory states that a high capital ratio is correlated with low stock performance, it also provides stability that can help in the avoidance of losses in times of crisis. This raises the question of which effect of CAR is dominant; the negative effect in good times, or the positive effect in bad times. Furthermore, the regressions performed by Pelster, Irresberger & Weiß (2016) used separate coefficients for Tier 1 capital, Tier 2 capital, liquidity, and capital requirements and estimated their implications on Buy-and-Hold Returns. In total, they estimated the correlation of 20 different coefficients. Le, Nasir, & Huynh (2020) also performed similar regressions to ours with the aim of finding correlations between stock performances and capital requirements. However, their regression models also differ from ours in terms of the number and type of variables used. Their paper studied the general

performance of a bank, including returns such as Return on Equity (ROE) and Return on Assets (ROA), while we wish to connect the theories of volatility and stock return to see whether a high capital requirement has an impact on the stock. The growth, performance, and internal revenue in terms of assets and equity do not necessarily have to represent the stock price and vice versa. While both of these studies provide a comprehensive understanding of the relationship between different capital requirements and their influence on stock returns, the large variety of coefficients fails to answer the question of how different qualities of capital, in relation to their risk weight, directly correlate with the stock return.

The thesis by Ljung (2017) evaluates the effects of Basel III on the same banks as we have, but we find that it leaves room for questions. Ljung's regressions were made with volatility as the main focus and the coefficients used were historical volatility, beta value, and Credit Default Swap-spread. The regressions performed in the thesis were performed for different time periods, such as before and after the creation of Basel II and III. While the paper provided additional knowledge on the relationship between Basel III and the general performance of banks and supported the theories of the discussed negative correlation, it did not provide any significant commentary or conclusions about the relationship between CAR and stock return. The thesis by Nedorezova & Maraval (2019) asked similar questions about the Basel III requirements as we do, but estimated the relationship between stock returns and liquidity requirements, also regressing the effects on different time periods that included different Basel Accords. While this is a good way to analyze the effects of Basel III and bank performance, it still leaves the question of the quality of capital unanswered. Using different Basel Accords period dummies confounds the effect of the Basel Accords with the effect of other period factors such as Covid-19 and any other potential time-related factors, while we instead use an explicit measure of Capital Adequacy Ratios in the regression.

The apparent pattern is that while there have been many studies performed on the matter of capital requirements and their correlation with the performance of banks, there have not, to the best of our knowledge, been any studies performed on the direct correlation between the Capital Adequacy Ratio and stock returns. We see this as an important empirical gap, as CAR is a fitting variable to estimate stock returns on the matter of capital requirements, as quality of capital is a central part of banking regulations. Furthermore, our reasoning for using CAR and not simply the concentration of different qualities of capital as Pelster, Irresberger & Weiß (2016), is that CAR internally calculates the ratio between different forms of capital in

relation to their risk-weighted assets. We perceive CAR to be the best metric when measuring the banks' ability to absorb potential losses, which is one of the main purposes of Basel III. CAR adequately accounts for the probability of default for different assets, and a high CAR can therefore be associated with low risk and is in this context used as a representation of capital requirements in general, as the purpose of capital requirements is to safeguard banks from different types of risk exposure. The research regarding Basel III and its effects is a comprehensive study, and we hope to add to this by documenting this correlation as a step to further analyze and understand the broader effects different forms of capital requirements can have on the performance of banks, and in turn, serve as a substratum for the discussion on the effectiveness of the Basel Accords in general.

3.0. Institutional Background

In this chapter, we walk through each Basel Accord to provide insights and background on the requirements that they each implemented and how they affected the banks' risk exposure. We also provide commentary on why each new Accord replaced its predecessor to showcase the development in the research on how capital requirements affect banks.

3.1. What happened in 2008?

The financial crisis of 2007-2009, often referred to as The Great Recession, was due to a subprime mortgage crisis. The American housing market faced a substantial increase in home foreclosures due to unsustainable acceleration in lending subprime mortgages. U.S. banks transitioned from a traditional banking structure where loans were held in their balance sheet, to a structure where the granted loans were securitized after being originated. As Nanto (2009) points out in his report for Congress, this means that instead of holding onto their loans and collecting interest payments, banks bundled loans of various qualities and sold them as securities. The low-quality loans had low underwriter criteria and a decreased spread in subprime-prime. The issue with this banking structure is that banks base their business model on liquidity transformation. Banks create value by using deposits from their customers to finance long-term investments. The housing loans created on a foundation of low-quality capital served as high-risk investments, and with the steep growth of such loans the banks became very susceptible to liquidity risk. When the loan-takers of these subprime mortgages later defaulted on their loans, it caused not only American banks to fail, but it caused a great amount of loss for banks internationally. International banks had invested in the bundles of securities that were made up of these high-risk loans. When banks started seeing losses in

their balance sheets, this led to a lack of trust between banks who became reluctant to lend each other money - an important part of the interbank market. This caused a global decrease in credit availability and purchasing power for both consumers and businesses.

The nature of the crisis revealed that the Basel II requirements were not stringent enough to either prevent this crisis or help mitigate the outcomes. Cannata & Quagliariello (2009) list the six main issues with the Basel II framework as follows:

I. Basel II did not require banks to hold enough capital to protect themselves from liquidity risk.
II. The interaction between the new Capital Accord and fair-value accounting caused banks to suffer large losses.
III. The capital requirements reinforce business cycle fluctuations, as they require banks to hold more capital in good times and less in bad times.
IV. The framework is subject to conflict of interest, as it relies on non-banking institutions, such as rating agencies, to assess credit risk.
V. The framework made the faulty assumption that the banks' internal measures of their own risks were superior to the measurements made by external parties.
VI. The framework provided incentives that made it hard to determine the banks' true level of risk by enabling banks to remove risky assets from their balance sheets.

Beltratti & Paladino (2016) further discuss these issues and conclude that the most relevant factor was the inadequacy of capital requirements. Many banks found loopholes in the Basel II requirements by assigning a lower risk weight to their capital when calculating their Risk Weighted Assets (RWA) and therefore accounted for a higher Capital Adequacy Ratio (CAR) than they had.

3.2. The Basel I Accord

The framework for Basel I was established in 1988 and focused mainly on credit risk, setting a minimum requirement for capital. Balin (2010) performed a nontechnical analysis on the subject. He states that the significance of Basel I is that it did not cover other risks than credit risk. However, to expand the scope of risk, Basel I also accounted for a minimum capital requirement aimed at market risk. The main objective of Basel I was to introduce an international standard for capital adequacy ratios, including minimum requirements for both

Tier 1 ratios and Total Capital ratios. Here, BCBS first introduced its classification of RWA to serve as the denominator for the Capital Adequacy Ratios. The Accord can be divided into four pillars (Balin, 2010, p.2):

I. The Constitutes of Capital
II. Risk Weighting
III. A Target Standard Ratio
IV. Transitional and Implementing Agreements

I. The Constitutes of Capital

Regulatory capital is divided into two groups of capital, Tier 1 and Tier 2, also known as *core capital* and *supplementary capital*. In short, Tier 1 capital is capital of higher quality which consists mainly of a bank's common stock and retained earnings. Tier 2 capital is of lower quality and consists mainly of a bank's preferred stock and subordinated debts. The purpose of holding different types of capital is to provide a buffer against potential losses, by ensuring that the bank has enough funds to withstand losses without facing solvency risk. The main difference between the tiers is on what basis they absorb losses (Balin, 2010, p.3).

II. Risk Weighting

The Basel framework sets minimum capital requirements for assets given their risk weight. Risk-Weighted Assets are calculated by:

$$Assets \times Risk\,Weight = RWA \qquad \textbf{(1)}$$

The Basel framework requires that banks calculate their RWA for credit risk, operational risk, and market risk.

III. A Target Standard Ratio

Basel I set the following capital requirement to protect banks from credit risk:

A bank's RWA must be covered by:

- 8% Total Capital (Tier 1 + Tier 2)

IV. Transitional and Implementing Agreements

This pillar entailed the incentives and requirements for the implementation of the Accord in each country. The surveillance and enforcement of the implementation of the Accord for each bank fell under the responsibility of the corresponding central bank (Balin, 2010, p.4).

The criticism of the Basel I Accord was widespread. The main theme of the criticism is that it was inadequate for ensuring global financial stability. The main reasoning behind the criticism was mainly that the Accord was too narrow. Basel I only targeted credit risk within the G-10 countries, which did not provide protection against various other types of risk and was not global enough to protect against macroeconomic trends. Another highly criticized part of Basel I is that it provided incentives for the banks to use a skewed RWA, as they could augment their risk weights by putting more risk on their loan books than balance sheets, which gave them a higher CAR than they actually had. In 1999, the BCBS, therefore, proposed a new, more comprehensive, Basel Accord; Basel II (Balin, 2010, p.5).

3.3. The Basel II Accord

As a response to the shortcomings of the Basel I Accord, the BCBS formulated a new framework with three, more comprehensive, pillars. The undertaking of the Accord started in 1999 and was finished in 2004. The Accord was divided into three pillars: Minimum Capital Requirements, Supervisory Review, and Market Discipline.

1. Minimum Capital Requirements

Basel II expanded on the capital requirements of Basel I, and created a measurement that was more sensitive to the bank's RWAs. The minimum Total Capital Requirement remained at 8%, but banks now had to hold a minimum of 4% Tier 1 capital. The risks were then internally divided into credit risk, operational risk, and market risk, creating a clearer framework for how to measure different types of risk. This was done in the hope that banks would achieve more success and accuracy when estimating and reporting their level of risk in different areas, in order to incorporate RWA in their Capital Adequacy Ratios (Ibid, pp.6-11).

2. Supervisory Review

To supplement the risk measurements in Pillar 1, Basel II implemented requirements for banks to develop a risk management framework to ensure that the assessment of the banks' risk profile was accurate and appropriate. The process was based on four principles; Comprehensive Assessment, Forward-Looking Approach, Systematic Evaluation, and Supervisory Action (Balin, 2010, pp.11-13).

3. Market Discipline

In order to increase transparency and the possibility of making informed decisions regarding investments in the bank, Basel II required all banks to publicly disclose all information about capital adequacy, risk profile, and the previously mentioned risk management process. The key features of Pillar 3 are Disclosure Requirements, Frequency of Disclosure, and Accessibility of Information (Balin, 2010, pp.12-13).

3.4. The Basel III Accord

The Basel III Accord was initiated in December 2010 and its main focus was to strengthen the level of high-quality capital, with Basel II requiring a 4% Tier 1 capital ratio, and Basel III requiring 4.5%. The intention of holding a higher Tier 1 ratio is that it can help absorb losses. To adjust for differences in definitions of capital, Basel III also aims to clarify the roles of Tier 1 and Tier 2 capital, which both make the Accord easier to implement, but also decrease the risk of loopholes in the Accord. A central part of the critique of Basel II was that banks did not accurately assess or manage their own risk, and the definitions and requirements were therefore made more stringent in Basel III. Additionally, banks under Basel III are required to hold a 2.5% conservation buffer existing of risk-weighted assets, which brings the total Total Capital Ratio to 10.5% (BIS, 2019).

Type of Capital	Required Minimum Level
Common Equity Tier 1 (CET1)	> 4.5%
Additional Tier 1 (AT1)	> 6.0%
Tier 2	> 8.0%
Total Capital Ratio	> 10.5%

Table 1: Basel III Capital Ratios

Basel III also introduced a minimum Liquidity Coverage Ratio (LCR). This requirement serves as an instrument for short-term resilience in case of financial stress. Banks are obligated to provide enough High-Quality Liquid Assets (HQLA) in the form of cash or assets that can be converted into cash without a significant loss in value, to meet liquidity requirements for 30 days. This way, regulators and authorities have a month to develop or change current regulations to prevent a bank's failure (BIS, 2013).

$$LCR = \frac{Stock\ of\ HQLA}{Total\ net\ cash\ outflows\ over\ the\ next\ 30\ calendar\ days} \geq 100\% \quad \textbf{(2)}$$

The second standard that was implemented with Basel III is the Net Stable Funding Ratio (NSFR), which as well as LCR was put in place to make the financial sector more resilient. The key difference is that NSFR was developed for long-term stability (one-year periods). The NSFR states that the available amount of stable funding should always be equal to or greater than the required amount of stable funding (BIS, 2018):

$$NSFR = \frac{Available\ amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} \geq 100\% \quad \textbf{(3)}$$

Basel III also introduced a new requirement to minimize systemic risk. To do so, Basel III allows regulators to amend the requirements for the quantity of capital banks must hold under periods of excessive credit growth. If this tool is used correctly it can serve as a countercyclical buffer. Moreover, Basel III requires a non-risk-based leverage ratio that is set based on the relative relationship between Tier 1 capital and total exposure (BIS, 2018).

3.5. The Capital Adequacy Ratio

The Capital Adequacy Ratio (CAR) measures a bank's available capital in relation to its risk-weighted credit exposure. CAR measures Capital-To-Risk Weighted Assets in the same way as banks report their Total Capital Ratio. The formula is as follows:

$$Capital\ Adequacy\ Ratio = \frac{Tier\ 1 + Tier\ 2}{Risk\ Weighted\ Asset} \quad \textbf{(4)}$$

A high CAR means that a bank has a higher level of capital relative to its RWA. This indicates that a bank has a higher chance of absorbing losses in the case of e.g. a market downturn, and therefore a high CAR is associated with lower risk for the asset in question (Investopedia, 2021). Tier 1 Capital absorbs losses on a *going-concern* basis, which means that they absorb losses as they occur, with CET1 absorbing losses immediately. Tier 2 capital absorbs losses at a *gone-concern* basis, meaning that when a bank fails, instruments of Tier 2 capital absorb losses before depositors and creditors do. Furthermore, Tier 1 capital is divided into two subgroups: Common Equity Tier 1 (CET1) and Additional Tier 1 (AT1). CET1 includes shareholders' equity excluding proposed dividends, deferred tax assets, intangible

assets, and certain other regulatory adjustments defined in EU regulation #575/2013. AT1 includes qualifying forms of subordinated loan liabilities (BIS, 2019).

4.0. Conceptual Framework

In this section, we summarize theories and models relevant to our thesis and explain both how they serve as a foundation for the theory and how they are to be used for the purpose of answering our research question, as well as how theories have laid the ground for some of our assumptions.

4.1.0. Theories of Risk and Capital

4.1.1. Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is used to estimate an investment's expected return based on its risk level. Byström (2020) explains that the model helps investors understand the relationship between a given risk-premium (Beta), the expected excess return of a given investment, and the expected excess market return. The general idea is that for investors to be willing to take on risk, they need to be compensated for that risk with a higher expected return. Two important variables in CAPM are the risk-free rate of return and the expected market return. When estimating the expected return of an individual investment, CAPM uses these variables to analyze how risky the investment is in relation to the market and how much larger return we can expect from taking on said risk, compared to an investment that is in line with the market risk and expected market return. This is what is called the *excess return*. The formula for the CAPM is as follows:

$$\mu_i = r_f + \beta_i\left(\mu_{market} - r_f\right) \qquad \textbf{(5)}$$

Where μ_i is the expected return for asset i, r_f is the risk-free rate, β is the risk premium, μ_{market} is the expected market return (Kenton, 2023).

4.1.2. The Beta Coefficient

The risk premium, Beta, is a function of the covariance of the asset and the hypothetical market portfolio. The beta coefficient helps us understand how the value of an investment changes relative to changes in the market. Beta represents a systematic risk, which means that it cannot be eliminated by diversification. It is estimated by comparing the covariance the

asset has with the market in their returns with the variance of the market's return for the given period you want to examine. The calculation for the Beta coefficient is as follows (Kenton, 2022a):

$$Beta\ (\beta) = \frac{Covariance\ (R_e, R_m)}{Variance(R_m)} \qquad \textbf{(6)}$$

$\beta = 1$	Perfect correlation with the market
$\beta < 1$	Less volatile than the market
$\beta > 1$	More volatile than the market

Table 2: The Beta Coefficient

4.1.3. The Security Market Line

The CAPM theory and Beta values can be represented graphically through the Security Market Line (SML), which is a linear function given by the previously stated formula for CAPM. It shows the relationship between systemic- and market risk plotted against the expected return of the market. By evaluating an asset with the CAPM formula, you can then graphically see where your asset lies in relation to the SML. The SML is a characteristic line that represents how much return, in theory, an investor requires given a certain level of risk (Kenton, 2022b).

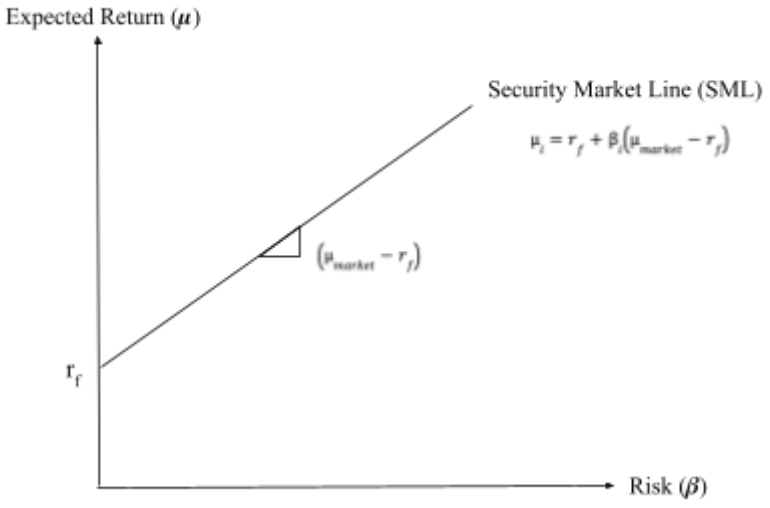

Figure 1. The Security Market Line

4.2. Systemic Risk and Bank Runs

The financial sector is dependent on the state of the economy, but some events in the financial sector can be serious enough to itself affect the economy. This is called systemic risk. Hendricks, Kamhu & Mosser (2006) explain systemic risk as if several banks fail or have enough financial issues, this can cause a large enough loss in the financial system to have severe consequences on the economy as a whole. The most common form of systemic risk starts with a bank run. Commercial banks hold their customers' money on the liability side of their balance sheet and are required to pay the customers back at any given time. The other side of the balance sheet is the bank's assets, in which they give out loans in return for an interest rate. While holding your money in savings- or checking accounts can seem harmless, it is inherently unstable. Bank runs are a sort of self-fulfilling prophecy; if your bank faces liquidity issues, and you believe that all other customers in your bank will be withdrawing their deposits, you would also want to cash in your deposits before the bank runs out of money. In practice, this creates panic among depositors leading them to "run to the bank". If a bank run occurs in one bank, the panic can spread to customers of other banks, even ones that initially did not have financial issues, potentially leaving banks with a negative balance sheet. If events like these are large-scale enough, it affects the economy. Requiring banks to hold a certain capital ratio can therefore partly mitigate the risk of facing liquidity issues, and potentially defuse concerns among customers.

4.3. Conceptual Implications on Hypothesis

As stated, our hypotheses are as follows:

$\mathbf{H_0}$	Capital Adequacy Ratio and Stock Return have a **non-significant** correlation
$\mathbf{H_1}$	Capital Adequacy Ratio and Stock Return have a **negative** correlation

$\mathbf{H_0}$	Capital Adequacy Ratios **do not affect** the Beta Value of the stock
$\mathbf{H_1}$	Capital Adequacy Ratios **reduce** the Beta of the stock

Firstly, from the Capital Asset Pricing Model, we learn that the expected return of an asset is dependent on the level of risk associated with the asset and the excess market return. The volatility of an asset can be derived from its Beta value. The Beta coefficient is important to our thesis, as we want to examine if capital requirements have led to lower volatility and a stable expected return, in times when the market as a whole is volatile and holds relatively

low expected returns. Furthermore, we use the Security Market Line to demonstrate the linear relationship between risk and return, as a theoretical framework for our hypotheses. As a high CAR is associated with low risk, CAPM theory and the SML supports our hypotheses that high capital requirements lead to a lower expected return. Lastly, the theory of systemic risk is relevant to our study as higher capital ratios may to some extent provide insurance for systemic risk, and therefore we might find evidence of this in the results of our CAPM, especially in the relationship between the returns of the banks and the return on the market. CAPM will be tested with a simple linear regression using OLS and therefore indicate how each bank separately has performed compared to the market during the years of interest.

However, CAR is not examined in CAPM, which is why we have constructed a regression model (including CAR) which will be defined thoroughly in the next section. We will be performing a regression using panel data to achieve a broader perspective of how Swedish banks, in general, perform when adjusting their Capital Adequacy Ratio. Panel regression is favorable due to its increase in statistical significance and more precise parameters compared to separate linear regressions for each bank.

5.0. Data and Methodology

In this section, we present our regression model and the data we have used. We comment on the data and explain the variables of our model with the aim of providing an understanding of the methodology used to reach our results.

5.1.0. Data

This paper examines the stock returns of four major operating banks in Sweden; Skandinaviska Enskilda Banken (SEB), Svenska Handelsbanken (SHB), Swedbank (SWE), and Nordea (NDA). The data used in the thesis has been collected from the banks' quarterly reports sheets between the years 2010 to 2022 and the Bloomberg Terminal. From the balance sheets, we were able to extract the Capital Adequacy Ratio for each bank in a given quarter, while the Bloomberg Terminal was used to collect the return of OMXS30, the return for each bank, and the stock price at the end of each quarter. As a risk-free rate, we have chosen the Swedish policy rate, set by the Swedish Central Bank (Riksbanken) every quarter for the years 2010 to 2022 which was collected on the website of Riksbanken. Some papers (Damodaran, 2008) use Long Term Government Bond Rate as the Risk-free Rate and others

(Mukherji, 2011) have found the rate of Treasury bills as the more suitable option for r_f. For our thesis, however, we found the policy rate as a more suitable option due to its stability over our observed time period.

5.1.1. Descriptive statistics

Before analyzing the actual regression results, it is of interest to see how the variables vary between the banks. As Table 3 shows, the quarterly average excess stock return for SEB and SWE is more than twice the size of the quarterly average return for Handelsbanken. Both SEB and SWE have on average generated higher returns than the market while Handelsbanken and Nordea have on average generated lower returns compared to OMXS30. The Min- and Max values for the returns show that SHB was less volatile than the other banks, which is also confirmed by the standard deviation for SHB compared to the other banks.

Table 4 shows the descriptives for the stock prices. The mean for Swedbank's stock is clearly higher than the remaining three banks, but the explanation for that is not included in this thesis. Finally, there are also some differences in the bank's different capital ratios that we soon are going to examine. Historically, Swedbank and Handelsbanken have had higher Capital Ratios compared to Nordea and SEB. A pattern between CAR and Excess Stock Return by only looking at these tables is hard to find since the two banks with the highest respectively lowest CAR mean both had the lowest average returns.

Excess Stock Return (%)	**Obs.**	**Mean**	**Std. Dev**	**Min**	**Max**
SEB	52	2,33	0,118	-29,70	25,98
Handelsbanken	52	0,91	0,086	-17,58	18,83
Nordea	52	1,15	0,112	-25,85	27,94
Swedbank	52	2,24	0,120	-33,10	28,26
OMXS30	52	1,48	0,077	-20,38	16,97

Table 3. Descriptive statistics of the Excess Stock Returns

Stock Price (SEK)	Obs.	Mean	Std. Dev	Min	Max
SEB	52	82,16	22,97	37,38	125,85
Handelsbanken	52	95,54	22,97	58,70	129,77
Nordea	52	82,54	16,74	53,25	113,10
Swedbank	52	154,76	41,50	72,55	225,20

Table 4. Descriptive statistics of the Stock Prices

CAR (%)	Obs.	Mean	Std. Dev	Min	Max
SEB	52	20,88	0,035	13,80	25,90
Handelsbanken	52	24,06	0,034	19,00	31,40
Nordea	52	19,52	0,037	13,20	26,30
Swedbank	52	23,33	0,047	17,50	32,50

Table 5. Descriptive statistics of the Capital Adequacy Ratios

5.2. Methodology

For this thesis, we approached our research question empirically, by collecting data necessary to test the CAPM and our regression model. The model is as follows;

$$R_q = \alpha + \beta_i(R_q^m - r_f) + \varepsilon_q \qquad \textbf{(7)}$$

In Table 6 and Table 7 we have listed our variables used for this thesis. We estimated CAPM with time series data (2010-2022) on the excess stock returns $R_q = \frac{P_q - P_{q-1}}{P_{q-1}} - r_f$, where P_q is the stock closing price on the last day of quarter q, and P_{q-1} is the same variable but for the previous quarter. The explanatory variable used for CAPM is the excess market return OMXS30 ($R_q^m - r_f$) (market index for the top 30 most traded stocks on the Stockholm Stock Exchange subtracted by the risk-free rate) and the coefficient of interest is β_i, which will give us information regarding each stocks' volatility during the observed years. As (5) specifies, r_f is the intercept of CAPM, but we have rearranged it as shown in (7) since an intercept is automatically included when performing linear regressions using OLS. We should therefore expect $\alpha = 0$ for all four banks.

R_q = Excess Stock Return for the Bank in Quarter q
α = Constant
β = Beta Value
R_q^m = Market Return in Quarter q
r_f = Risk-Free Rate
ε_q = Error term in Quarter q

Table 6. Variables for CAPM

The second part of our analysis will consist of a Panel Data Regression, where we regress the banks' stock returns on Market Return, Capital Adequacy Ratio, and an interaction variable of those two. The model is as follows;

$$R_{i,q} = \alpha + \beta R_q^m + \theta CAR_{i,q-1} + \gamma R_q^m \cdot CAR_{i,q-1} + \varepsilon_{i,q} \qquad \textbf{(8)}$$

Our dependent variable $R_{i,q} = \frac{P_{i,q} - P_{i,q-1}}{P_{i,q-1}} - r_f$ is the excess stock return for bank i in quarter q. Our first explanatory variable R_q^m is the excess market return $(R_q^m - r_f)$. This variable is of interest to see whether there is a statistically significant relationship between how the stocks of our observed banks performed in relation to the market that they are listed on. Our second explanatory variable $CAR_{i,q-1}$ is crucial since the purpose of this thesis is to determine the stock's performance when the banks adjust their capital adequacy ratio, which is why we have lagged the variable by one quarter. Our third and last explanatory variable $R_q^m \cdot CAR_{i,q-1}$ is an interaction variable between the market return and the lagged capital ratio which we have created to see in which way stock returns vary with the market return, depending on CAR. We will use our model to perform a panel data regression since we have data over both space and time. To perform our analysis we have used the statistical software for data science, Stata.

$R_{i,q}$ = Excess Stock Return of Bank *i* in Quarter *q*
α = Constant
β = Market Return Coefficient
R_q^m = Excess Market Return in Quarter *q*
θ = Capital Adequacy Ratio Coefficient
$CAR_{i,q-1}$ = Capital Adequacy Ratio of Bank *i* in Quarter *q - 1*
γ = Interaction Variable Coefficient
$R_q^m \cdot CAR_{i,q-1}$ = Interaction Variable
$\varepsilon_{i,q}$ = Error Term for Bank *i* in Quarter *q*

Table 7. Variables for Panel Data Regression

6.0. Results and Interpretation

In this section we will first present our results from the Capital Asset Pricing Model, we interpret the coefficients and the implications they have. The second step of this Chapter is to present the output from the Panel Data Regression and interpret each coefficient and the implications they have for this thesis.

As a first step, we analyze the standard CAPM as specified in (7) for each stock using a time series variation, where the results are reported in Table 8. As mentioned earlier, this regression gives us the Beta coefficients of each stock during this time period and therefore indicates how volatile the stocks have been in relation to the market. All coefficients are statistically significant, with a p-value < 0,001. SEB was the most volatile stock, 16,2% more volatile than OMXS30, followed by NDA which had a coefficient of 1,127 which implies a 12,7% higher volatility than the market. SWE and SHB had beta values of 0,709 and 0,887 respectively which indicates a volatility smaller than the OMXS30. One would therefore be exposed to greater risk by buying SEB or NDA stocks, but also expect a higher return. The contrary applies to SHB and SWE, there is less risk but also less expected return from the

stocks. α can be interpreted as the excess return of a stock relative to what the CAPM predicts. If any α:s for our stocks would be positive and significant, the expected return of a stock would be greater than what CAPM predicts, implying that one could "beat" the market by purchasing that stock. The result however shows that all α:s are approximately zero and statistically insignificant.

CAPM	**Coefficient**	**Std. error**	**t**	**P > | t |**	**[95% conf. interval]**	
β_{SEB}	1,162***	0,142	8,18	0,000	0,877	1,447
α_{SEB}	0,007	0,111	0,63	0,528	-0,0153	0,0295
β_{SHB}	0,709***	0,123	5,79	0,000	0.463	0,956
α_{SHB}	-0,0012	0,00963	-0,12	0,906	-0,0205	0,0182
β_{NDA}	1,127***	0,131	8,64	0,000	0,865	1,389
α_{NDA}	-0,0033	0,0102	-0,32	0,750	-0,0239	0,0173
β_{SWE}	0,887***	0,181	4,90	0,000	0,524	1,251
α_{SWE}	0,0098	0,0142	0,69	0,493	-0,0187	0,0383

*n = 52, N = 208, * p<0,05, ** p<0,01, *** p<0,001*

Table 8. Capital Asset Pricing Model

We continue with the panel regression, which is the main focus for this thesis. The results from the regression are summarized in Table 9. Keep in mind when reading this section that we formatted our panel data in such a way that we won't be able to see the individual effects of the variables on each bank's return. The panel data results will instead be interpreted as the average impact that each variable has on our outcome variable.

All variables are significant on the 95% level, and the greatest coefficient is our interaction variable, the product of the market return and the lagged CAR. The Market return alone has a positive correlation with the banks' stocks with a coefficient of 2,047 which suggests that when the Swedish market is performing well, Swedish banks are on average performing even

better (conditional on a given level of lagged CAR). The Capital Adequacy Ratio is also correlated with banks' future stock returns. The coefficient $\theta = -0,345$ suggests that a 1% increase in CAR is associated with a decrease in the average stock return in the next quarter by 0,345% (holding all other variables constant).

The interaction variable between the lagged CAR and Market Return is significant (**) with a coefficient of -5,08. This suggests that our interaction variable significantly affects the relationship between the market return and stock return, that is, how CAR affects the β of the stocks. So the higher CAR, the less is the stock return going to vary with the stock market return. This means that the stocks on average will decrease by less when the market return decreases, but also that the stocks will increase by less when the market return increases. In financial terms, the coefficient of the interaction term tells us that a higher capital ratio will on average make the bank more resilient to market fluctuations.

Return	**Coefficient**	**Std. error**	**t**	**P > | t |**	**[95% conf. interval]**	
R_q^m	2,047***	0,388	5,26	0,000	1,279	2,813
$CAR_{i,q-1}$	-0,345*	0,140	-2,47	0,014	-0,621	-0,070
$R_q^m \cdot CAR_{i,q-1}$	-5,080**	1,790	-2,84	0,005	-8,612	-1,50
Constant	0,0790*	0,0311	2,53	0,012	0,0175	0,140

*N = 208 * p<0,05, ** p<0,01, *** p<0,001*

Table 9. Panel Data Regression Output

7.0. Discussion

In this chapter we discuss our results from a theoretical point of view, firstly by comparing our results with the findings in the previous literature. We later discuss the possible implications our results have on the financial theories discussed in chapters 3 and 4. The chapter concludes by discussing possible limitations and caveats of our study, implying what possible future research can be conducted to fill these caveats.

7.1. Comparison of Findings with Literature Review

The findings of our regressions support a substantial part of the previous literature. The results are in line with the conclusions of Le, Nasir, and Huynh (2020), that capital requirements have a negative impact on the profitability of banks. Interestingly, their models found a more significant negative relationship between capital requirements and stock performance, even though the banks they analyzed had lower capital requirements than ours did. An explanation for this could be the possibility that the relationship between capital ratios and returns could be non-linear. We have estimated this relationship at a high level of capital ratios but if the relationship is non-linear, it could be that previous papers have looked at the lower part of the distributional capital ratios.

Our results can also be interpreted as aligned with the findings of Nedorezova & Maraval (2019). Their research regarded the relationship between returns and liquidity requirements. If we combine our results, both liquidity requirements and capital adequacy requirements have a negative correlation with the stock return, it could point to the conclusion that regulatory requirements, in general, have a negative impact on the stock return on banks. However, Ljung (2017) found that the implementation of Basel III led banks to have lower volatility, which is in line with our results that capital requirements lead to lower fluctuations in returns. Another important result was the coefficient for the interaction variable γ. As mentioned, this negative coefficient tells us that higher capital ratios reduce the sensitivity of stock returns to market fluctuations, i.e., making the stock less volatile. We know that the Capital Adequacy Ratio is a component used to strengthen the banks against market risk, which is why this result is interesting. An increase in CAR is associated with an average decrease in the next quarter's stock return, but this will however make stock return on average more resilient to market shocks, which is in line with what Ljung (2017) found as well.

Pelster, Irresberger & Weiß (2018) came to the conclusion that more Tier 1 capital would impact the bank’s stock negatively, and vice-versa during financial hardship. For our banks, there was no such positive correlation, but you can however see how this strong relationship between market return and CAR would be reduced during financially unstable times. Unfortunately, we could not perform any substantial analysis on this model using our own data, as our number of banks is only four and the years of financial strain are also few. Any regressions made on individual years with our data set could not be considered significant enough to contribute to the research.

7.2. Theoretical Implications of Results

The final result of our panel regression model supports our hypothesis that there is a negative correlation between CAR and Stock Return. This correlation suggests that banks' stocks, due to a required amount of CAR, in general, have lower future returns the higher CAR is. Theoretically speaking this result makes sense due to the variables included in the mentioned ratio. If a given bank was to increase its CAR it would have two options. Either they increase their Tier 1 or Tier 2 capital, which implies that they hold more capital available, or they invest in assets associated with lower risk, thus reducing their RWA. The first option means that there is more capital to absorb any losses, but the banks incur an opportunity cost by doing this since they give up the opportunity of investing that capital in potentially more profitable investments. The second option implies that they are more robust to losses since the risk for their assets is lower than it was before, that is, the probability of incurring losses is reduced. Disregarding which option banks choose to adjust their CAR, they point in the same direction. A high Capital Adequacy Ratio is, on average, associated with lower stock returns.

The panel regression model also supports our hypothesis that CARs reduce Beta Values. The support comes from the significance of the interaction variable. It shows that the level of Capital Adequacy Ratio has an impact on the relation between stock returns and market return, that is the Beta Value. This result is particularly interesting because it implies that a higher CAR can make the stocks covary less with the market return, so the stocks are more robust when CAR is increased. As already discussed, the banks have two alternatives when they want to adjust Capital Adequacy Ratio. Holding more capital has its purpose, which seems to have given an effect on our banks during the observed years.

Regarding systemic risk, if the theory is to be taken literally, we would expect that the banks with the highest CARs should have the lowest Betas, which is what we found in our regression models. To examine this relationship further, a study would need to be conducted on a larger sample size. If we assume that we are correct in estimating that lower expected returns correlates with higher capital ratios, this would support the theory that high capital ratios can lower systemic risk. This has an implication for investors, depending on how much risk they are willing to take on. Some will prefer lower volatility, with the cost of potentially

lower returns, while others will want to generate higher returns, with the cost of greater stock volatility.

Lastly, the matter of the efficiency of the Basel Accords remains. Our results provide more data and empirical evidence that there is a negative correlation between capital ratios and Swedish bank stock performance. However, a clear answer to the question of whether Basel III is an adequate enough accord to mitigate the risk of banks in times of financial strain lies years ahead. To give a sure answer on the effectiveness, we anticipate a waiting period of a few years before there is enough data on how the Accord has affected banks. The issues with Basel II were articulated two years after the crash of 2008, and the current financial market is still unstable and the direction it will go is not yet known. However, Sweden is one of the countries that have come comparatively far in their implementation of Basel III, and our results could be interpreted as an indicator of the direction a broader study on the matter would go, namely that higher CARs lead to lower returns, which are associated with lower risk. This could be used as an argument in favor of Basel III if the theoretical background and empirical studies are to be believed. However, evaluating Basel III in this matter goes beyond the scope of this thesis.

7.3. Potential Limitations and Caveats of Findings

When analyzing the results of our CAPM-regression, one has to keep in mind that it suffers from endogeneity, that arises from simultaneity. Simultaneity in a regression model occurs if your independent variable is explained by your dependent variable, which is the case in this thesis. OMXS30 is as earlier mentioned a market index of the 30 most traded stocks on the Stockholm Stock Exchange in which the banks we have observed are included. Therefore, the bank's stock return affects OMXS30, which we use to explain their stock returns with CAPM. Since we've used the excess return of OMXS30 as an explanatory variable and a part of our interaction variable there is bias present in our main regression model as well. Another issue is the fact that banks set their own CAR, which also raises endogeneity issues in the form of omitted variable bias. How banks make these decisions and why they set their CAR at the exact level that we have observed is a topic excluded in this thesis due to time limitations. We are aware of these limitations which is why we throughout this thesis (and in our hypotheses) have used the term *correlation*. From these banks during these years we cannot draw any conclusions in terms of causal effects, but rather correlations, associations and relationships between variables. In future research, one might want to address the

potential endogeneity bias in order to provide a final answer to the main research question. However, we believe that we have taken a step forward in breaching the gap regarding the direct correlation between capital ratios and stock returns.

Another limitation to point out is the fact that stock returns are affected by a great number of variables, some that you can control for and others not. As Table 3 shows, Swedbank is the bank that has had the greatest return during the observed years but also the greatest downfall, at -33,10% in the first quarter of 2019. In February 2019 the Swedish News Channel SVT reported that Swedbank may have been used for money laundering, and suspicions that some major shareholders were informed about this scandal going public led the Swedish Economic Crime Authority to start investigating the bank (Nilsson, 2022). The fact that Swedbank's stock price plummeted during this quarter is more likely due to this event and less likely due to their change in Capital Adequacy Ratio from 21,50% to 20,00%. To include this and all other possible external events or factors that have affected the bank's quarterly returns during a period of 13 years would require time and comprehension that is out of reach for a bachelor's thesis. This also connects to the omitted variable bias that causes endogeneity in our results.

Another important possible limitation is that we are only using four banks. In Sweden, there are only four banks that are listed publicly, and the rest are owned by private companies. As we wanted to see the effect CAR has on stock price, we could not include banks that are not listed on the stock market. The potential problem with this gap in data is that our results may or may not apply to the rest of the Swedish banking sector, that is, the results of our study might lack external validity.

8.0. Conclusion

This chapter serves as a final conclusion of what questions this thesis aimed to answer and how the results from our study are aligned with the hypotheses.

The main question we asked was "How have capital adequacy ratios affected the stock returns of Swedish banks?" and from there we stated the following hypothesis:

$\mathbf{H_0}$	Capital Adequacy Ratios and Stock Returns have a **non-significant** correlation
$\mathbf{H_1}$	Capital Adequacy Ratios and Stock Returns have a **negative** correlation

Our regression models showed a negative correlation between the CAR and Stock return, and as this was the case, we rejected this null hypothesis.

The secondary question "How do Capital Ratios affect the Volatility of the Stock Return, relative to that of the entire market?" led us to state our second hypothesis:

H_0	Capital Adequacy Ratios **do not affect** the Beta Value of the stock
H_1	Capital Adequacy Ratios **reduce** the Beta of the stock

Our results showed that the CAR significantly affects the relationship between the Market Return and the Stock Return, which is given by the reduction of the Beta value. Therefore, we have rejected this null as well. That higher CAR is associated with lower returns but also lower volatility presents a trade-off in a sense. This trade-off relates to investors' attitude towards risk, where some (risk-averse) might prefer a higher CAR since CAR reduces volatility and thus exposure to market risk, and others (risk-neutral) might prefer a lower CAR.

9.0. References

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