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IMPACT OF MACROECONOMIC AND BANK-SPECIFIC FACTORS ON BANK PROFITABILITY DURING RAPID MACROECONOMIC CHANGE

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I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
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has not been previously presented for grading.

The document length is 8137 words from the introduction to the end of the conclusion.

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ABSTRACT

Impacts of macroeconomic environment to banking performance can be large-scale and haven't been widely assessed in the Nordic countries. As the interest rates have increased by record-breaking pace in the end of year 2022, the impacts on banking profitability can be material and the final scale will be identified only in long-term. This thesis investigates the short-term effects on banking profitability of such interest rate increase in the Nordic countries banking sector.

By analysing the performance of 60 Nordic banks in the period from 2019 to 2022, it can be concluded that at least bank-specific variables have influenced banks profitability. The interest rate increases might have had positive impact on bank performance during the period, along with bank-specific variables, such as bank size and cost efficiency that have contributed to profitability.

The key findings of this study is that in the short-term, banking profitability in the Nordic countries might have been positively impacted by increasing interest rates, even fast pace, which has not been the case in all individual banks around the world. However, the long-term impacts on performance of the Nordic banking sector are yet to be seen and requires further research.

Keywords: banking profitability, interest rates, Nordic countries

INTRODUCTION

After the financial crisis in 2008-2009, the central banks started to stimulate the economy by starting a period of unconventional monetary policy. Meaning that the central banks purchased large amounts of long-term securities to drive the interest rates down to stabilize and resurrect the markets while announcing that interest rates would remain low for a longer time period. (Neely, 2015) This uncommon macroeconomic environment prevailed from the end of 2009 until the middle of 2022, when the nominal interest rates set by central banks were close to zero, in Europe even negative for 2015-2022 (European Central Bank, 2023).

During this time, banks operations were initially disrupted since they couldn't generate interest income as before due to the lowered central bank rates. Earlier studies have shown that banks profitability is decreased while they operate in low nominal interest rate environment (Borio et al., 2017), thus banks were incentivized to increase income from non-interest sources, like fees and investments while decreasing their deposit expenses (Lopez et al., 2020). Lopez, et al., (2020) found that banks were able to effectively outweigh the drop in interest income by higher volume of income from fees and investment operations.

Recently the central banks have risen the nominal interest rates in the second half of 2022, which is likely to increase the interest income for individual banks. As they have collected higher amount of fees during the low interest rate period from 2009-2022, it is fascinating to find out whether the banks have benefitted from the macroeconomic shift to higher interest rates in 2022, or if the positive impact of higher interest rates has been offset by its negative effects on investing and costs.

The aim of the thesis is to find out how the banks have performed during the rapid macroeconomic shift to higher interest rates during the period from the latter half of 2019 to end of 2022, and if they have been able to utilize the increased interest rates and supplement it with the heightened commission fees to contribute to profitability.

The main research questions for this thesis will therefore be:
Has the banking profitability been positively impacted in the short-term, as a result of the rapid increase in interest rates as the zero-interest period has come to an end?

Hypotheses:
H1: Banking profitability is impacted by increase in interest rates.
H2: Banking profitability is positively impacted by increase in interest rates.

The research provides information on how banks have performed during the shift from unconventionally low interest rates to higher rates in 2022, which can be used for managerial decision making in the future in case a similar event presents itself. Furthermore, the thesis can work as a starting-point or inspiration for future studies, assessing the impacts of the unprecedentingly high pace of growth in interest rates and its impact on banking performance. The impacts of changes in macroeconomic environment, such as interest rate fluctuation, GDP growth and inflation can have large scale effects on banking system which is a backbone of integrated global economy.

1. Literature review

For many years, academics have been interested in the profitability of banks. Numerous studies have investigated the elements that affect banks' profitability. The nominal interest rates set by central banks have been found to contribute to an improvement in the profitability of particular banks (Lopez et al., 2020; Staikouras & Wood, 2004). The contribution of such increase to operating revenue of banks, however, appears to be offset in studies that indicate a negative link between interest and non-interest income (Smith et al., 2003).

The market structure of banks' operating environments and management's capacity to boost efficiency can have an impact on profitability in addition to interest rates and income (Berger, 1995). These factors can play a major influence in the profitability of banks and significantly affect the overall functioning of the banking industry.

Considering this, the purpose of this thesis is to ascertain if a hike in interest rates beginning from mid-2022 has contributed to increases in banks' profits or if such earnings have been impacted by firm-specific decisions. This thesis seeks to contribute to the body of knowledge on bank profitability by analyzing these factors.

1.1. Macroeconomic vs firm-specific factors of bank profitability

Earlier research shows that higher interest rates and a steeper yield curve increase bank profitability by boosting net interest income, but the positive effect is partially offset by higher loan loss provisions and decreased non-interest income. Non-linear effects are also found, and the impact of monetary policy on bank profitability was positive in the first two years post financial crisis but turned negative in the following four years. The overall effect of monetary policy on bank profits also depends on its impact on wider macroeconomic conditions. (Borio et al., 2017)

A recent investigation conducted by Lopez et al. (2020) examined the impact of the low interest rate period between 2010 and 2017 on the profitability of a total of 5200 banks across Europe and Asia. The study found that the effects of negative interest rates versus low positive interest rates on bank profitability were only marginally distinguishable. However, it revealed that the decline in interest rates had a substantial influence on various components of the total income. Banks were able to adapt to the new macroeconomic environment by compensating for a decrease in net interest income through increases in non-interest income, which included capital gains in different securities as well as increases in fees. (Lopez et al., 2020) Banks generate additional income besides interest income by charging fees for a variety of services related to their clients' accounts, such as account opening and monthly payments, financial advisory services, and sales of different financial products such as investment instruments. The findings suggest that banks were able to effectively increase the level of commissions and fees, thereby maintaining their profitability despite the decreased interest rate levels.

Additionally, different studies have shown to provide differing results on whether macroeconomic or bank-specific factors impact the profitability of banks. Research conducted in Pakistan focusing on the time period before and after the financial crisis of 2008, declared that only bank-specific factors, such as liquidity, bank size, non-interest income and level of deposits impacted the bank profitability significantly. Based on this study, macroeconomic variables like GDP growth rate, real interest rate and inflation had statistically unsignificant impact on performance of banks included in the sample. (Javaid, 2016)

Many researchers have come to a conclusion that at least one of the two categories of variables, macroeconomic or bank-specific, are impacting profitability. A recent study made in UK found a significant connection of funding strategy, liquidity, productiveness, cost efficiency and size on profitability but also an impact from inflation (O'Connell, 2022), while another study declared that variables of business cycle like GDP growth and interest rates impact banking profits (Albertazzi & Gambacorta, 2009). This paper will also try to determine which category of factors – macroeconomic or bank-specific, have an impact on bank profitability in the Nordic countries.

As the central banks around the world announced the end of the low interest rate period in 2022, discussion in news focused on impacts of the increased rates on overall economy. It is interesting to examine how this has, and will, impact profitability of the banking sector. Economists from Federal Reserve Bank of Richmond have explained how the rising central bank rates could

impact profitability of the banking sector and why. They note a usual assumption is that increasing interest rates will in all circumstances positively contribute to the profitability of banks, which does not always hold true. (Ennis et al., 2016)

The authors state three main factors determining whether the impact of interest rate increase will increase or decrease banking profits. First, since traditional way of operating for banks is to receive deposits from customers, and then lend the customers' resources forward in forms of different credit products, typically a maturity mismatch exists between assets and liabilities. The assets of banks are held for much longer period than liabilities, which creates an unfavourable environment for banks in case of interest rate increases. If interest rate increase leads to higher interest paid on deposits and banks are not able to increase the interest earned from products of their set portfolio, the net interest margin is tightening. (Ennis et al., 2016)

Second factor the authors named is the market power an individual bank holds. In an event of increasing interest rates, if an individual bank can retain a lower level of interest paid on deposits compared to the market and retain its' customers, a bank's net interest margin can increase as new loans generate higher interest income, but interest expenses related to consumer accounts remain level. (Ennis et al., 2016)

Third observation by the economists is that the business model of a bank contributes to the direction of relation between profitability and interest rate increases and can decrease the level of maturity mismatch a bank has between the two sides of its' balance sheet (Ennis et al., 2016). Referring to these findings it is not always clear how increased central bank rates impact banking profitability, especially after the extended period of abnormally low interest rates. Therefore it is intriguing to be aware how this macroeconomic event impacts the profitability of banking in the Nordic countries.

1.2. Theories

There are also theories explaining the differing profitability of banks operating in the financial sector. Numerous research trying to explain the profitability in the banking sector rely on theories of correlation between profitability and market structure measures, such as concentration or market share. According to the traditional structure-conduct-performance (SCP)

hypothesis, highly concentrated markets generate less beneficial conditions for consumers as deposit rates tend to be lower and loan rates billed for customers higher, inflating the profits of the banks. Another related theory, the relative-market-power (RMP) hypothesis, suggests that dominant companies, or banks in this case, in the market are positioned superiorly and can produce exceptional products and dictate the prices, which leads to earning profits above the average (Berger, 1995).

On the other hand, there exist two interpretations of the positive correlation between profitability and either concentration or market share, which stand in contrast to the two market-power theories. These theories explain the connection with profitability and market share/level of concentration in the market, by higher efficiency of operations in the organization relative to competition. The X-efficiency hypothesis of the efficiency theories argues that organizations with better management can introduce more efficient operations through managerial decision making and thus generate higher profits, which then leads to a bigger proportion of the overall market (Athanasoglou et al., 2008). The other efficient-structure hypothesis, called scale-efficiency hypothesis, supposes that organizations might have as competent management, but some organizations utilize economies of scale in their production. Therefore they are able to decrease their unit costs, leading to higher profits per output (Berger, 1995). Thus, the efficiency theories explain the link between profitability and higher market shares by reasoning that higher market shares are earned by superior management and operational decision making, which then leads to inflated profits.

This thesis can also contribute to literature around these two theories by examining whether firm size or firm-specific efficiency meters have an impact on bank profitability in the Nordic countries. Therefore, we can introduce two complementary research questions. To assess the impact of market power we use the bank size as a measure, although it is not the most optimal measure for determining market power, since not all the banks in the sample operate Nordic-wide. The absolute market share of a particular bank would fit the need better, but the author doesn't have that data available. In order to investigate the impact of operational efficiency, the operating margin is introduced as a metric. Commonly used metric of cost efficiency in studies regarding banking is cost-to-income ratio (Borio et al., 2017), but operating margin should fit just as well, as it is the opposite of cost-to-income ratio. As stated earlier, a causal relationship between these two theories has not been established, which neither this thesis is pursuing to accomplish. However, the thesis can examine if there is support for one or both of these theories

present in the Nordic banking sector, hence two additional research questions are introduced. “Does the size of the bank impact banking profitability in the Nordics?” and “Does the operating margin impact banking profitability in the Nordics?”

1.3. Nordic banking sector

Taking into account that the Nordic banking system's national sectors exhibit comparable vulnerabilities and that banks operate across various countries in the region, it is plausible to assess the Nordic banking industry as a single entity. Nordic banks have a longstanding tradition of cross-border operations. Notable examples include Nordea, formed by the merger of Merita Bank and Nordbanken, Handelsbanken, and Danske Bank's acquisition of Sampo Bank. Taking this into account, banking sector in the Nordics is linked inside the region to a moderate degree. (Savolainen & Tölö, 2017)

The banking sector in the Nordic countries has experienced historically low levels of loan losses and exhibits robust profitability and strong capital adequacy. Despite being significant and consolidated, these national banking industries face the most significant risk from lending in the private and commercial real estate markets. The banking industries in Finland, Sweden, Norway, and Denmark exhibit comparable strengths and weaknesses. (Savolainen & Tölö, 2017)

The banking industry in the Nordic countries has an exceptionally robust capital adequacy, which is attributable in part to the internal credit risk models' low risk weights and the banks' sound profitability and provisioning. The sector has maintained strong profitability, thanks to the historically low levels of loan losses and revenue from trading and net fee income regardless of the decreased net interest income after the financial crisis. Even though the Nordic banking sector has faced a very low level of loan losses, the increases in interest rates and inflation might impose the sector to elevated risks due to high indebtness of residents, hot housing market and economy’s reliance on global demand of domestic products. (Savolainen & Tölö, 2017)

2. Data

For any research project the gathering and analysis of data is one of the cornerstones of success, and this bachelor's thesis is no exception. This chapter will give an overview of the data gathered and examined for this study. The main data gathered is financial information for 60 Nordic banks. The data is made up of income statement and balance sheet information that is gathered quarterly during the previous 3.5 years totalling at 14 quarters. Four Swedish banks, 34 Norwegian banks, 19 Danish banks, and three Finnish banks are included in the sample.

Apart from the financial information gathered from 60 banks in the Nordic region, this research incorporates macroeconomic data. The author collected and examined interest rates from each respective national bank, which is crucial to offer a more comprehensive analysis of the banks' financial performance. By integrating interest rate data, the study can evaluate how macroeconomic factors might have affected the banks' financial performance. In general, this study's inclusion of macroeconomic data allows for a more complete understanding of the Nordic banking industry, enabling a deeper comprehension of the factors that impacted the banks' financial performance during the transition from low to increased interest rates.

The chapter shall provide a reader with a thorough description of the data used in this thesis. This overview includes the data sources, the process of collecting and cleaning the data, and the methods used to analyze the data. By providing a comprehensive overview of the data, this chapter aims to provide readers with a more thorough understanding of the study's results and conclusions. Additionally, the limitations of the data and potential biases that may affect the results will be discussed to increase transparency of the study and to increase the validity and reliability of the study's findings. A detailed account of the data that was collected and analyzed for this bachelor thesis is presented in this chapter, which works as a foundation for the subsequent chapters in which the findings and conclusions of the study will be discussed.

2.1. Methodology

To assess the relationship between bank-specific and macroeconomic factors on bank profitability a multiple regression analysis is conducted. According to Gujarati & Porter (2009), regression analysis is a powerful tool for understanding the relationship between variables in

finance. As it enables the discovery of intricate relationships between variables, regression analysis is especially helpful when analyzing large datasets with numerous variables. This is applicable to this thesis because it assumes that a variety of factors will affect banks' profitability.

Regression analysis is used to determine the important factors that affect the dependent variable and to evaluate the connection between the independent and dependent variables. Regression analysis can help to identify the direction and magnitude of the relationship between variables, and to quantify the impact of changes in the dependent variable by changes in the dependent variable. The method has some restrictions and underlying assumptions, while being a useful and effective way to assess relationships between multiple variables. One of the key assumptions of regression analysis is that the relationship between the independent variables and the dependent variable is linear. Other assumptions include normality, homoscedasticity, and independence of auto-correlation. (*Assumptions of Linear Regression,* Statistics Solutions)

In this study a fixed effects regression models will be built to test for variables impacting bank profitability. A fixed effects regression model enables to control for bank-specific factors that do not vary over time, such as bank size. As these variables may correlate with variables that are of focus in the thesis, such as interest rates, interest income or costs, they can therefore bias the results of a normal linear regression analysis. According to a book by Woolridge (2010) on econometric analysis, a fixed effects regression is a useful method to account for time-invariant unobserved heterogeneity in panel data analysis.

2.2. Variable selection

The sub-chapter will describe the variables used in this study, explain how they are expected to impact the independent variable and why. A summary of all variables is laid out in table 1.

2.2.1. Dependent variables

Previous research has extensively investigated the determinants of banking profitability across various regions around the world. Therefore, this study builds on existing research by selecting appropriate variables to explain banking profitability in the Nordic countries. A comparison of variables used in this study and previous research is shown in table 2. The measure of profitability used in this study is based on a commonly used value: return on assets (ROA).

Numerous studies, including recent work by Öhman & Yazdanfar (2018) on Swedish banks and earlier research by Athanasoglou et al. (2008) on Greek banks, have used ROA as the dependent variable to explain banking profitability. ROA is calculated by dividing the net profit by the total assets of the organization and is considered an indicator of the bank's operational efficiency through the utilization of its assets (Petersen & Schoeman, 2008).

In contrast, ROE is used in studies such as Tan et al., (2017) examining the impact of risks and efficiency on bank profitability in China, and in research conducted by Căpraru & Ihnatov (2014) exploring bank profitability in Central and Eastern Europe. ROE is calculated as the net profit divided by shareholders' equity, representing the yield for shareholders of a unit of profit. Since banks are required to maintain sufficient capital to meet capital adequacy requirements and mitigate the risks of bank vulnerability in changing market conditions (Petersen & Schoeman, 2008), ROE provides valuable insights into the bank's profitability from the perspective of shareholders. In the Nordic countries, banks typically have strong equity levels, as evidenced by a study conducted by Berglund & Mäkinen (2019), which demonstrated that Nordic banks have systematically increased their capital buffers since the 1990s banking crisis and continued to do so throughout the global financial crisis until at least 2010.

To investigate the determinants of banking profitability in the Nordic countries, this study will develop regression models, with ROA as the measure of profitability. As stated by Athanasoglou et al. (2008), deployment of ROE as a measure of profitability bypasses the leverage risks and incentivizes to higher degree of leverage. Furthermore, as banks operate under high regulatory requirements for equity capital, ROA is considered as a better value for showcasing profitability in this context.

2.2.2. Independent variables

In the regression model, independent variables are classified into two broad categories, namely firm-specific and macroeconomic variables. Prior studies have typically employed macroeconomic variables to mitigate the effects of macroeconomic events on their regression models, as evident in the works of Öhman & Yazdanfar (2018) and Dietrich & Wanzenried (2014). In this study, interest rates are the variable of focus, and the paper aims to evaluate the impact of rates set by central banks on the profitability of commercial banks. Moreover, to control for economic growth this study employs GDP growth as a covariate, following the

precedent of previous research conducted by Öhman and Yazdanfar (2018) and Dietrich and Wanzenried (2014).

As for the firm-specific variables, this paper will place as well commonly used variables. Independent variables inserted to the regression model are:

Size: Natural logarithm of total assets represent the size of the bank's balance sheet and thus is a variable illustrating the relative size of the company. In earlier studies the natural logarithm of total assets is used to mitigate the impacts of heteroscedasticity in the sample. By transforming the independent variable, the variance of the dependent variable can be made more constant and the larger observations don't dominate the regression model. A study by Gul et al. (2011) states that bank size is expected to have a positive impact on profitability since larger organizations are likely to benefit from larger scale of operations.

Leverage: The Debt-to-assets ratio (D/A) is a measure that reflects the degree to which an organization employs financial leverage to support its operations. Various theories that examine the optimization of a firm's capital structure provide different implications of how D/A ratio impacts profitability. The Trade-off theory, proposed by Kraus & Litzenberger, (1973), suggests that a firm's value is maximized when it reaches a tipping point where the marginal costs of additional debt financing outweigh the benefits. The theory implies that debt financing is advantageous up to a certain point, but becomes prohibitively expensive beyond that. Previous literature has demonstrated a negative relationship between E/A and Return on Assets (ROA) (Dietrich & Wanzenried, 2014, Borio, et. al., 2017, Pradhan & Khadka, 2017). Therefore, it is reasonable to assume that the opposite relationship holds true for the current study, since E/A is the opposite measure of debt-to-assets.

Table 1. Summary of variables used

Variables	Explanation	Measure of	Expected impact on ROA
ROA	Net income divided by total assets	Profitability	N/A
LN Total Assets	Natural logarithm of the size of balance sheet	Bank size	+
D/A	Debt divided by assets	Degree of leverage	+
Interest Income Margin	Interest income divided by total income	Source of income	+
Operating Margin	Operating income divided by total income	Cost efficiency	+
Total Asset Growth	Growth rate of assets compared to previous quarter	Growth of operations	+
Policy Rate	Interest rate set by central banks to steer overall economy	General rate level	+/-
GDP Growth	Growth rate of GDP compared to previous quarter	Economic growth	+/-

Source: Created by author on Microsoft Excel

Interest income margin: Interest income is regarded as the primary traditional source of revenue for banks, generated through the lending of assets to customers. Interest income is expected to positively impact the profitability of banks. The interest income margin is calculated as interest income divided by total income. The variable also gives some insights to the operating model of the banks in a way that it illustrates the level of interest income activities of a bank compared to non-interest income generating operations.

Operating margin: Operating margin, calculated as operating income divided by total income, is a measure of efficiency of a bank. It measures the cost efficiency of banks' operations as the metric shows what percentage of revenue is the bank able to convert into operating profit. Usually researchers incorporate cost-to-income ratio's in their studies (Borio et al., 2017) as the ratio is more commonly used in banking. Since cost-to-income ratio illustrates, how big of a percentage a company's costs are compared to income, the operating margin is the opposite of this metric and therefore the relation with ROA is expected to be the opposite, i.e. positive.

Table 2. Variables used in this studies, and earlier studies

Variables:	Borio et. Al, 2017	Staikouras & Wood, 2004	Mostak Ahamed M, 2017	This study
D/A	x (E/A)	x (E/A)	x (E/A)	x
Interest income margin			x (non-interest income)	x
Asset growth lag			x	x
Operating margin	x			x
LN TA	x	x	x	x
Policy rate lag	x (short-term rate)	x		x
GDP growth lag	x	x		x

Source: Created by the author in Microsoft Excel

Asset growth: To assess how a bank's growth impacts the profitability, asset growth rate compared to previous period is added to the model. Earlier researchers have argument that one major contributor to banking profitability can be elevated growth rates in banks' operations (Mostak Ahamed, 2017), hence the asset growth rate is expected to positively correlate with the dependent variable, ROA.

2.2.3. Data collection, data sources and shortcomings

The primary source of bank-specific data for this study is Bloomberg. The data collected from Bloomberg includes financial statement data for the 60 banks in the sample. The financial

statement data included income statement and balance sheet data for each bank for the past 3.5 years, amounting to 14 quarters. In addition, interest rate data was collected from all respective national banks for the same time period. The interest rate data is used to analyze the relationship between interest rates and bank profitability. Lastly, data to control for economic growth was collected from Eurostat including GDP growth of all 4 Nordic countries in the sample: Denmark, Finland, Norway and Sweden.

The data collection process was not without its shortcomings. The primary limitation was the lack of access to all relevant financial ratios, such as loan loss provisions, liquidity, and maturity of debt. These financial ratios can be useful in understanding the financial health of banks, and their exclusion slightly limits the scope of this study. Therefore, this shall be taken into account while assessing the results of the thesis.

2.3. Descriptive statistics

In this chapter the author is further describing the data and the main variables of interest concerning the regression analysis. As mentioned before we are looking at guarterly reported financial statement data compiled from Bloomberg for 60 different Nordic banks operating in Finland, Sweden, Norway and Denmark.

As seen from the table 3, the mean ROA of the bank included in the sample is 0.78% with a standard deviation of 2.46. The sample's ROA is ranging from a minimum of -26.32% to 8.44% as the maximum return on assets. This implies that some of the banks are having trouble in generating profit, which might impact the final results. Operating income for banks in the sample has as well fluctuated a certain amount, indicating the earlier mentioned profitability issues for some individuals included in the sample. However, the mean and median values are rather close, suggesting that the amount of outliers is not significanlty large.

Based on this sample, Nordic banks earn 70% of their income from interest bearing assets on average, which are the most traditional revenue generating assets for banks. There is relatively little variation in interest income margin – hence the standard deviation is only 0.19 and the mean and median values are rather close (0.70 and 0.72 respectively). The highest interest income of 1.44 is explained by negative non-interest income due to losses in investing operations

higher compared to other non-interest income, which generates a negative net non-interest income.

Table 3. Descriptive statistics

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
ROA	0.78	0.97	2.46	-26.32	8.44
D/A	20.84	20.20	17.18	0.00	69.23
Interest income margin	0.70	0.72	0.19	0.00	1.44
Total asset growth	0.02	0.01	0.08	-0.26	1.16
Operating margin	35.38	42.09	38.80	-368.03	229.64
LN TA	10.17	9.55	2.10	4.96	15.28
Deposit facility	-0.14	-0.50	0.80	-1.00	2.40
Policy rate	0.53	0.00	0.81	-0.25	2.75
Marginal lending facility	1.09	1.00	1.13	-0.45	3.75
GDP growth	0.03	0.05	0.09	-0.15	0.25

Source: Created by the author in Microsoft Excel

During the sample period, the policy rate has fluctuated between -0.25% and 2.75%. The magnitude of this change can be quite substantial, with each central bank rate varying by multiple hundred basis points. Such fluctuations in interest rates can have profound effects on the revenue-generating capabilities of banks, as they can impact borrowing costs, profitability, and lending volumes, among other factors.

The presented visual representation, denoted as Figure 1, portrays the chronological changes in the average return on assets (ROA) across all banks within the Nordic countries. The illustration demonstrates a slight decline in ROA at the onset of the observation period, followed by a gradual rise in the latter half of 2020 for all nations. Notably, Norway's banking industry experienced a fast upturn in the average ROA, which consequently positioned it with the highest mean ROA of over 1% in the examined sample, despite having the lowest value of ~0.3% at the initial stages of the period under scrutiny.

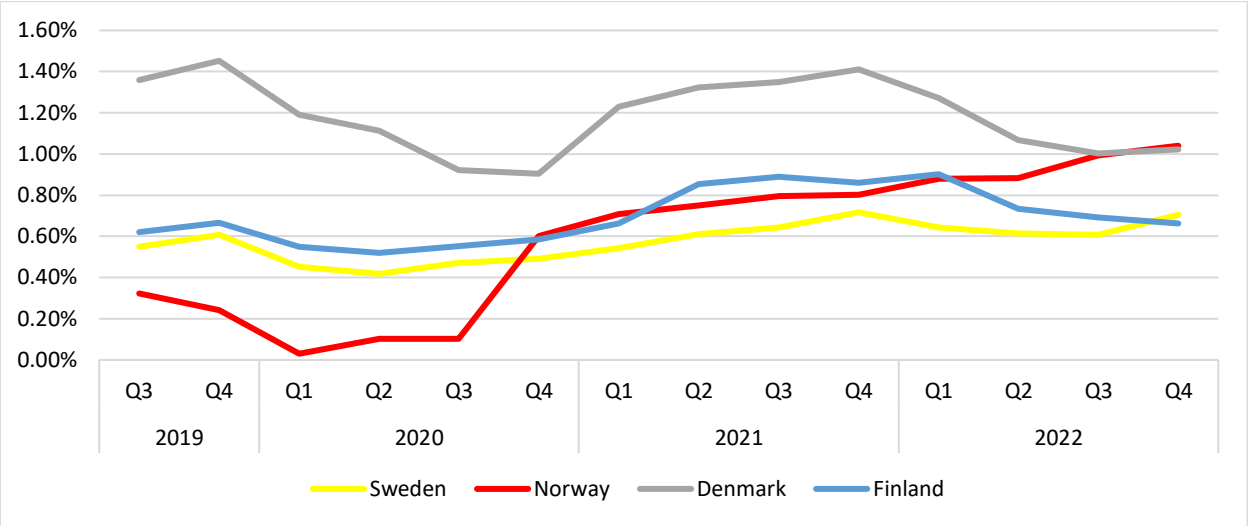

Figure 1. Average ROA per country (2019-2022)

Source: Created by the author on Microsoft Excel

Denmark's average ROA in the banking sector has experienced ups and downs during the time frame. The nation had the highest mean return on assets, which decreased from over 1.4% to under 1% in one year, from the end of 2019 till the end of 2020. During the next year the Danish banking sector's ROA managed to recover close to it previous heights but has afterwards decreased and leveled out to 1% in the last quarter fo 2022. Finland's and Sweden's ROAs did had a low increasing trend over the sample period, but a downturn in the last year has obliterated the incresaes almost totally. The nations share an average ROA of approximately 0.5%.

The visualisation of change in policy rate over time for each country in Figure 2 further describes the variation of the rate from the descriptive statistics of the Table 3. From the line chart it is visible that the Norwegian central bank, Norges Bank, has been the most active and proactive as well in its operations regarding changing the policy rate, which steers the overall economy. Norges Bank has decreased the interest rate on the brink of the COVID-19 pandemic from 1.5% to zero, in order to soften the hit of the virus breakdown on the Norwegian economy, and announced it was likely to keep the rate at the zero-bound level for a while (Norges Bank, 2020). After the first year of the pandemic the central bank started to slowly increase the policy rate from the zero level to 0.5% at the end of 2021 due economic recovery from the pandemic and the forecasted inflation increases (Olsen, 2021). Norges Bank increased its' policy rate up to 2.75% in the end of the last quarter of 2022.

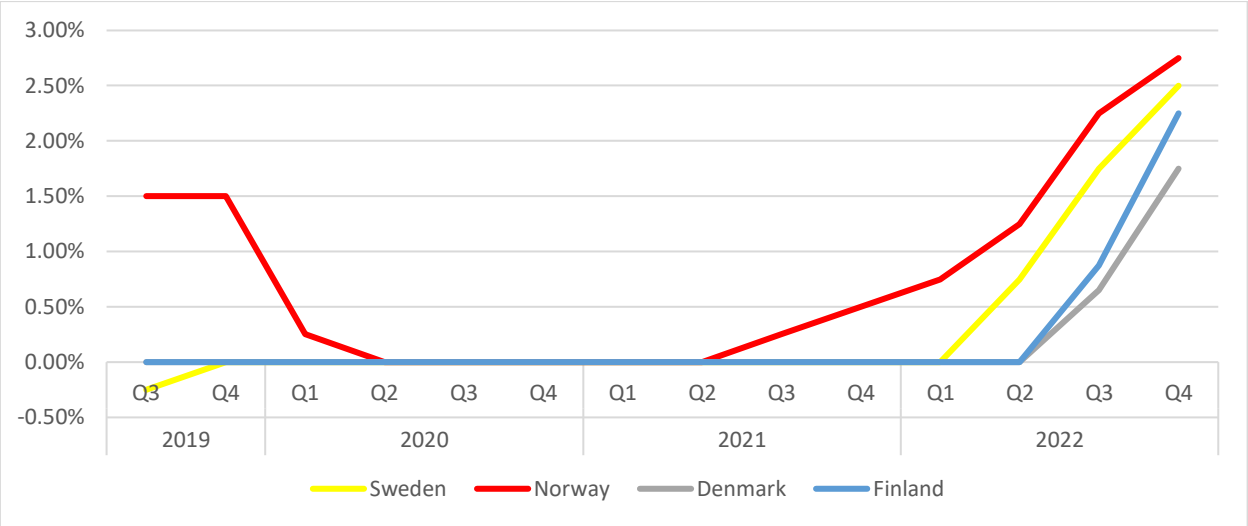

Figure 2. Policy rate per country
Source: Created by the author on Microsoft Excel

The other Nordic countries have kept their respective policy rates at the zero level from 2019 until the first two quarters of 2022. The Swedish central bank, Riksbank raised its rate from -0.25% to 0% on the 3rd quarter of 2019 to counter the inflanatory pressures due to strong local economic growth (Riksbank, 2019) and kept it at that level until Q2 of 2022 when the rate started to increase as like in all other Nordic countries as a counteraction to sharply risen inflation. The Finnish central bank, as a national branch of the European Central Bank, and the Danish, Danmarks Nationalbank, acted the latest of the Nordic countries and started to increase their policy rates on the latter half of 2022 resulting in a steep increase from 0% to 2.25% and 1.75% for Finland and Denmark respectively in the end of 2022. The Swedish policy rate stood at 2.5% at the last quarter of 2022.

3. Empirical results

In this chapter, the results of the regression model created by the author are explored, the research questions are answered and the validated hypothesis is chosen. The tool chosen for conducting the regression analysis on was RStudio, due to easy access and compatibility of use as the data was cleaned and modified in Excel.

3.1. Main results

Before running the regression analysis, a Variance Inflation Factor test (VIF) was made in RStudio to reduce the degree of bias from multicollinearity between indepdenent variables to be used in the regression model. A statistics book by Sohil et al., (2013) states that a VIF value below 5 is acceptable to state that the level of multicollinearity in one's dataset is low. The highest VIF value in the model reached 1.97, hence all the independent variables have a value less than 5, and the level of multicollinearity between the independent variables is low in the regression model. The table including the VIF values is visible in Appendix 1.

Additionally, to control for multicollinearity in the regression model, a correclation matrix of independent variables was created and analyzed. Based on the matrix, a highest correlation coefficient between the independent variables is 0.65 for natural logarithm of total assets and debt-to-assets ratio. The relation is rather logical, since both of the variables are based on asset size. Another, slightly elevated coefficient (0.39), is for the policy rate and interest income margin. As the banks earn more interest income during periods of higher interest rate levels, the links between these two variables is naturally present. Correlation coefficient for operating margin and asset size is 0.27, interest income margin and debt-to-assets is 0.22, whereas for operating margin and debt-to-assets it is 0.24. The rest of the correlation coefficients present in the matrix have a value less than 0.01. Based on these two methods to assess the level of multicollinearity in the regression model it can be concluded that some multicollinearity in the regression model is present, but shouldn't bias the outcome as the VIF values for all the independent variables are vely low, under 2.

The author chose to use a fixed effects regression in analysing the impacts of the different variables to banking profitability in the Nordic countries, since it controls for the bank-specific factors that do not vary over time, such as bank size and According to Woolridge (2010) is a suitable option to account for time-invariant unobserved heterogeneity in a regression analysis in the form of panel data. The fixed effects models are therefore used in many previous studies assessing the determinants of banking profitability conducted by other authors (Berger et al., 2005, Ali et al., 2018 & Olokoyo et al., 2019).

As stated before, this thesis investigates the impact of firm-specific and macroeconomic variables on banking profitability in the Nordic countries, which is discovered by a fixed effects

regression analysis. The final fixed effects regression model has ROA as the dependent variable and debt-to-assets ratio, interest income margin, total asset growth, operating margin and natural logarithm of total assets as the firm specific independent variables. To control for the macroeconomic factors, policy rate and GDP growth were inserted to the model as independent variables as well.

The results of the fixed effects regression model are visible in table 4. The chosen independent variables explain approximately 54% of the variation in the dependent variable, ROA, as the R-squared of the regression model is 0.53912. The adjusted R-squared, which takes into account that the value of R-squared increases as the number of used independent variables increase, has a value of 0.49972. Thus, the fit of the model is not largely manipulated by the number of independent variables since the two measures are very close. The statistical significance of the fixed effects model itself, measured by the F-statistic, is very high, as the p-value of the F-statistic provides a value less than $2.22e\text{-}^{16}$. Therefore, it can be concluded by a confidence of 99% that at least one of the independent variables included in the model is statistically significantly impacting the dependent variable. In other words, the fixed effects model can be stated as appropriate in assessing profitability of banks in the sample.

After assigning that the model is fit for the purpose of the study, the individual variables are examined. The results of the regression are visible in table 4, at the end of this chapter, with the coefficients of the independent variables and p-values. The model has two very significant variables and one highly significant variable and one significant variable. This study defines a very significant variable with a p-value less than 0.001, a highly significant with a p-value less than 0.01 and a significant with a p-value of less than 0.05. The highly significant independent variable is the D/A ratio, which measures the degree of financial leverage in a bank. The coefficient of the D/A ratio is 0.040, meaning that if the level of debt relative to assets increase, the ROA of a bank would move into the same direction. This finding is in contrast with previous studies that have discovered a negative relation between D/A and ROA (Dietrich & Wanzenried, 2014), Pradhan & Khadka, 2017), Borio et al., 2017, Staikouras & Wood, 2004). Referring to the The Trade-off theory, proposed by Kraus and Litzenberger (1973), the Nordic banks in general might not have reached the tipping point in the degree of leverage, where additional debt does not increase the profitability. This finding could be interesting to further investigate if the debt-to-asset ratio impacts profitability differently in the Nordic countries compared to rest of the world and the cause for that.

Of the two very significant independent variables, the first to be analysed is the operating margin. The measure of cost efficiency has a coefficient of 0.029 and yields a p-value less than 2.2e-16, indicating a high degree of statistical significance. The result is in line with earlier research on banking profitability and impact of interest rates where a positive relation with cost efficiency and ROA is present (Borio et al., 2017), however in this study the relation is statistically significant like in Dietrich & Wanzenried (2014). The finding supports the presence of cost efficiency positively impacting profitability of the banks in the Nordic countries, which might be caused by superior decision making and utilization of economies of scale in offering services/products to customers contributing to higher profitability as stated by the efficiency theories discussed earlier.

The second very significant independent variable is the natural logarithm of total assets with a coefficient of 2.346 and p-value also less than 2.2e-16. The bank's asset size increase therefore is positively in line with increases in return on assets for the banks in the sample. The identified relation is also concluded to exist by earlier research that have found highly significant correlation between logarithm of total assets and return on assets (Borio et al., 2017, Staikouras & Wood, 2004, Mostak Ahamed, 2017). This study however identifies a much stronger correlation between the two variables than the cited earlier research, which could raise a question for further investigation.

The last indepdendent variable with a statistical significance is interest income margin. The interest income margin has a high and positive relation with ROA as the coefficient for the variable is 1.001 with a p-value 0.013820. This finding supports that the interest income remains a significant source of income and profitability for banks. The study by Mostak Ahamed (2017) found that banking profitability in India was improved by increasing the share of non-interest income generating operations by banks, and concludes that has been the case in many emerging markets. However a study of US financial holding companies, which can be used as a reference for developed economies such as the Nordics, has found that increasing amount of non-interest income generating operations does decrease profitability in banking (Stiroh & Rumble, 2006). This difference can be due to different market characteristics between global markets. Mostak Ahamed (2017) states that "banks that have lower asset quality, in terms of the share of loan loss provisions or non-performing loans, can reap higher income diversification benefits compared to the banks that have higher asset quality". A counter argument by Stiroh & Rumble (2006),

explains the decreasing pofitability associated with increased non-interest income by high volatility of activities generating non-interest income. To conclude, this study's findings are in line with findings of Stiroh & Rumble (2006), that a higher share of interest income increases profitability of banks.

Table 4. Summary of the fixed effects model for ROA

	Coefficient	Std. Error	t-value	Pr(>|t|)	
D/A	0.040	0.015	2.638	0.009	**
Interest income margin	1.001	0.406	2.468	0.014	*
TA growth lag	-0.017	0.448	-0.039	0.969	
Operating margin	0.029	0.001	20.903	$< 2.2^{-16}$	***
LN TA	2.346	0.265	8.835	$< 2.2^{-16}$	***
Policy rate lag	0.079	0.043	1.813	0.070	.
GDP growth lag	-0.120	0.405	-0.296	0.767	
Number of observations	839				
Number of banks	60				
R-Squared	0.54				
Adj. R-Squared	0.50				

Note: 0.001: ***, 0.01: **, 0.05: *, 0.1: .

Source: Author's own calculations on RStudio

The policy rate has a coefficient of 0.0785680 and a p-value larger than 0.05 indicating that it is not statistically significant at the usual confidence level of 95% and is moderately correlated with ROA. This is in contrast to earlier findings that the banks benefit from the higher interest rates set by central banks (Borio et al., 2017, Staikouras & Wood, 2004). This would indicate that during the sample period, banks profitability was not materially improved by increses in policy rates set by central banks. The result can be due to earlier mentioned statement by Borio et. al., (2017) that the magnitude of impacts of monetary policy on banking profitability are determined by its' impacts on overall macroeconomic environment. In the Nordic countries recently, the roaming inflation and simultanoeus sharp increase in interest rates has caused worries for individual and domestic economies, which might be reflected in the result.

The rest of the independent variables', growth rate of total assets and GDP growth, p-values are not statistically significant resulting in 0.969 and 0.767. The result of bank's asset growth not impacting profits is in-line with previous studies, for example a research by Mostak Ahamed (2017). However a study by (Javaid, 2016) also concluded that a GDP growth rate was statistically insignificant when it comes to profitability of banks in Pakistan, but little explanation for that was provided. The author remarks that GDP growth and asset growth can have impact on profitability if lagged longer-term, which could not be assessed in this particular thesis due to restricted access to longer-term data.

Drawing back on the earlier discussion about the theories behind profitability of banks introduced by Berger (1995), findings from this study support that evidence of both, the efficiency theories, and theories of market power are present in the sample. The coefficient of the natural logarithm of total assets, representing size of an individual bank, is statistically significant (p-value: $< 2.2e^{-16}$) and the relation to ROA is strong, and positive (coefficient: 2.346). The coefficient of the operating margin, representing the cost-efficiency of operations, is also positive (coefficient: 0.029) and statistically highly significant (p-value: $< 2.2e^{-16}$). These findings support that both theories can be on point since metrics for both theories are statistically impacting the return on assets in the Nordic banking sector. Further research would be needed to specifically identify the causal relation between these variables. Is the profitability achieved by superior managerial decision making leading to cost efficiency, or by stronger market power compared to competition?

3.2. Robustness test

To assess the use of the chosen variables, another regression model imitating some of the variables used in a model by Borio et. al. (2017) is introduced. The model is almost the same as discussed before, except it excludes interest income margin and asset growth from the earlier model. The summary of the model is illustrated in table 5. The independent variables used in the second model are similar to the ones on Borio et. al. (2017), except in their study as a measure of efficiency, a cost-to-income ratio was utilised. The author's study incorporates operating margin as an input, which is the opposite of C/I ratio. As a measure of interest rate level Borio et. al.

(2017) uses the short-term rate, which they state is in attentive manner managed by the central banks. Finally, to include financial leverage into the model, Borio et. al (2017) has input equity-to-assets as an independent model, whereas the author has used debt-to-assets which also is the opposite of the variable used by the previous authors.

Table 5. Summary of the fixed effects model imitating variables used in Borio et. al. (2017)

	Coefficient	Std. Error	t-value	Pr(>|t|)	
D/A	0.039	0.015	2.578	0.010	*
Operating margin	0.028	0.001	21.021	$< 2^{-16}$	***
LN TA	2.457	0.255	9.627	$< 2^{-16}$	***
Policy rate lag	0.106	0.042	2.532	0.012	*
GDP growth lag	-0.080	0.400	-0.200	0.841	
Number of observations	839				
Number of banks	60				
R-Squared	0.54				
Adj. R-Squared	0.50				

Note: 0.001: ***, 0.01: **, 0.05: *, 0.1: .

Source: Author's own calculations on RStudio

By looking at the two models, it can be stated that the results are not impacted much by dropping the asset growth and interest income margin from the selection of independent variables. The r-squared of the second model is close to the one in the first, 0.54 and the relations between the independent and dependent variable are the same. However, the most notable change is, that the significance of policy rate increases as the p-value for the variable in the second model is 0.011. In this model also the impact of policy rate on profitability is higher with a coefficient of 0.11. For other independent variables, the coefficients and the statistical level of significance is similar as in the model built by the author. Slight change is for the coefficient of debt-to-assets, as the significance level has dropped from 0.99 to 0.95. Overall, the results are corresponding, and the fit of the model remains at a satisfactory level.

CONCLUSION

The thesis' goal is to investigate impact of bank-specific and macroeconomic variables on banking profitability in the Nordic countries. The basis for the research is the increases in non-interest income in banking, during the zero- or low-interest period after the financial crisis in 2008, and the recent rapid increase in interest rates during the second half of 2022. The hypothesis is that since banks were shown to increase their non-interest income during the low-interest rate period they could have improved their profitability as a result of interest rate increases by the central banks.

The sample for the study included 60 Nordic bank's income statement information and macroeconomic data from respective Nordic countries, including policy rates set by central banks. The data for banks income statements was collected from Bloomberg, interest rate data from respective central banks and data reflecting economic growth was collected from Eurostat. The data was cleaned and formatted in Excel and the statistical analysis was conducted in RStudio.

Based on the analysis of fixed effects regression models it can be concluded that in the Nordic banking sector firm-specific variables, contribute to the profitability of the sector. Statistically the main contributors to profitability are cost efficiency of banks and size of their balance sheets. Of bank-specific variables, also the proportion of interest income of total income and leverage ratio impact return on assets positively. By comparing the two fixed effects models, it can be concluded that the operating margin and asset size endure the robustness analysis the best. Both of the coefficients remain the most significant in the model and vary only little between the two models. From macroeconomic variables, the policy rate statistically impacts profitability only

when the operating margin is excluded from the model, implying that the policy rate does not have as strong impact on profitability.

As the news about major impacts of rapid increases in interest rates on banking have started to spread globally, it can be that hikes in interest rates do impact banks performance and can materially damage a bank's financial state. Further research examining the impact of this macroeconomic event on bank profitability and the impact of the pace of increase in interest rates could be executed as the environment evolves in the future. Research could also be more focused to find the impact of interest rate increases to immediate items on banks' balance sheets and identify if there is differing performance influenced by banks operating model i.e., different clients and different sources of income. Further studies could also compare performance of different banking sectors globally and try to examine factors influencing the outcome that differ between the markets.

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APPENDICES

Appendix 1. Table of VIF values of independent variables

Variable	VIF
Interest income margin	1.367
TA growth lag	1.058
Operating margin	1.111
LN TA	1.974
Policy rate lag	1.145
GDP growth lag	1.046

Source: Author's own calculations in RStudio

Appendix 2. Correlation matrix of independent variables

	D/A	Interest income margin	Operating margin	LN TA	GDP growth	Policy rate
D/A	1.00					
Interest income margin	0.22	1.00				
Operating margin	0.24	-0.08	1.00			
LN TA	0.65	-0.09	0.27	1.00		
GDP growth	0.00	0.04	0.07	0.00	1.00	
Policy rate	0.06	0.39	0.06	-0.01	-0.02	1.00

Source: Authors own calculations in Microsoft Excel

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