Nordic Banks and Negative Interest Rate Policy

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Abstract:
Ever since the global financial crisis (GFC), economies worldwide have been trying to recover from the worldwide recession. Central Banks have thus introduced different unconventional monetary policies to ensure additional monetary stimulus: however, with inflation still not meeting the wanted target and banks hoarding reserves, Central Banks introduced yet another radical monetary policy; Negative Interest Rate Policy (NIRP). The purpose of this research was to assess whether there have been changes in the way banks operate and make money during the period of negative interest rate. The theoretical framework of this thesis was comprised of literature on negative interest rates as well as literature on the various tools of monetary policies. The research questions were the following: Has the ratio of banks' net interest to total revenue changed in the period of 2010-2020? Did banks cut expenses to make up for possible loss in profit? Have banks increased fees to battle possible loss of income? Has the most important source of income changed due to NIRP? With both qualitative and quantitative data this research strived to answer the research questions using mixed method, where quantitative data sought to be explained by qualitative data. This research concludes that banks changed operating ways, but only slightly as the decrease of profit and net interest rate ratio made banks compensate for lost income with various fees and commissions. Negative interest motivated banks to develop new products, services and focus more on gains from non-interest income.

Keywords:	Negative interest rate, NIRP, inflation, monetary policy, ECB, net interest income.
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Finanssikriisistä lähtien taloudet ympäri maailmaa ovat yrittäneet toipua maailmanlaajuisesta taantumasta. Keskuspankit ovat näin ollen ottaneet käyttöön erilaisia epätavanomaisia rahapolitiikkoja varmistaakseen lisäelvytyksen talouksille. Tästä huolimatta inflaatio ei saavuttanut haluttua tasoa, ja pankit hamstrasivat varantoja, joten keskuspankit ottivat käyttöön vielä yhden radikaalin rahapolitiikan; Negatiivisen korkopolitiikan. Tämän tutkimuksen tarkoituksena oli arvioida, onko pankkien toimintatavoissa ja tulon tekemisessä tapahtunut muutoksia negatiivisen koron aikana. Tämän opinnäytetyön teoreettinen viitekehys muodostui negatiivisia korkoja käsittelevästä kirjallisuudesta sekä kirjallisuudesta rahapolitiikan eri työkaluista. Tutkimuskysymykset olivat seuraavat: Onko pankkien nettokorkojen suhde kokonaistuloihin muuttunut kaudella 2010-2020? Leikkasivatko pankit kulujaan korvatakseen mahdollisen tulonmenetyksen? Ovatko pankit korottaneet maksuja mahdollisen tulonmenetyksen torjumiseksi? Onko tärkein tulolähde muuttunut negatiivisen korkopolitiikan takia? Sekä kvalitatiivisella että kvantitatiivisella tiedolla tässä tutkimuksessa pyrittiin vastaamaan tutkimuskysymyksiin sekamenetelmällä, jossa kvantitatiivista tietoa pyrittiin selittämään kvalitatiivisella tiedolla. Tässä tutkimuksessa todetaan, että pankit muuttivat toimintatapojaan, mutta vain vähän, koska voiton ja nettokorkosuhteen lasku sai pankit kompensoimaan menetettyjä tuloja erilaisilla palkkioilla ja provisioilla. Negatiivinen korko motivoi pankkeja kehittämään uusia tuotteita, palveluita ja keskittymään enemmän muihin tulolähteisiin kuin korkotuloihin.

Avainsanat:	negatiivinen korko, inflaatio, rahapolitiikka, EKP, korkokate.
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CONTENTS

Figures

Tables

1 INTRODUCTION

After 2008 economies worldwide have been trying to recover from collapsed values of currencies, real estate, equities, and the worldwide recession (Allen and Carletti, 2009). Consequently, institutions managing monetary policies had to come up with repairing actions in order to increase economic activity back to its normal rate (Bech and Malkhozov, 2016; Arteta et al., 2016). Many unconventional monetary policies have since been introduced, one of which is negative interest rate policy (NIRP) (Arteta et al., 2016). Since the introduction of NIRP in 2009 it has affected financial institutions, especially in Europe after the second introduction of NIRP in 2012 (Jørgensen and Risbjerg, 2012).

Even though the consequences of negative interest rates on the profitability of banks have been researched, some gaps have been left for further, more detailed research. It is not common knowledge exactly how banks make money during negative interest rates and have the ways of profit making changed since the introduction of the negative interest rate policy. Therefore, this research is focused on the consequences negative interest rates have had on the banks and what corrective movement they have made to make profit during negative interest if they are affected by it.

Since the most significant source of income for most banks is net interest income (Pankkien tehtävät - Finanssialalle, 2021), it is to be considered that negative interest rate policy (NIRP) is affecting banks' profitability and the products on which financial institutions and their branches make money. Furthermore, NIRP introduction forced banks to change operating ways, introduce new services and IT programs, and increase competitiveness Researchers Demiralp et al. (2017).

This research is conducted through an analysis of annual reports and financial statements between the years 2010 and 2020. The research also includes analysis of banks' announcements and other reports to get a better insight on banks' way of adapting their operations after the introduction of negative interest rates, as well as interviews of employees of banks related to this research.

1.1 Motivation for the research

While not much is known to the public about what exactly NIRP affects in the banking industry, it is important to understand the consequences it already has made. Understanding the consequences may help clients and the banks, to anticipate and predict what may come and what to look out for. Better understanding of the changes forced by negative interest rates in the banking industry may change clients' behavior and spending.

The effect NIRP has on the banks' way of making profit may had come with the consequence of extending more loans, but with higher fees as some studies mentioned later suggest (see Demiralp et al., 2017). Understanding the change of bank's policies, activities and fees gives a greater picture of the effect negative interest rate policy had on the economy and the ways banks function nowadays. Knowledge of these changes will bring value not only to the banks, but also to clients as they are more aware of new possible activities and services of the bank, but also of the fees they are charged with.

Researchers Demiralp et al. (2017), Lopez (2018) and Turk (2016) mention that NIRP has affected banks' activities and the way banks make money worldwide, thus it is expected that Nordic banks included in this research have too changed the ways of operating. How have banks adapted to the environment of negative interest rates to stay competitive and profitable is left for further research by the researchers mentioned above. Thus, this research includes examination of banks' operations before and after the introduction of NIRP to see the possible changes made to stay competitive.

Furthermore, ratio changes of profit and key factors such as net interest income are calculated to conclude whether NIRP has influenced the key income activities. Banks' incomes such as commissions and fees, interest incomes, and other income are compared from year to yet to see patterns and possible changes in trends.

1.2 Purpose of the study and research questions

The main aim of this research is to find out has the way banks make money changed during the times of negative interest rates. This research answers the questions of what the biggest income sources after the introduction of negative interest are and whether they have changed since before NIRP. The study includes research on whether banks have made any loss in net interest income during negative interest rates and whether the ratio of the profit retrieved from interest rates have changed.

The first research question answers whether the effect of negative interests have been substantial for the most important source of income for the bank (net interest). Questions A, B and C depict what changes banks have made in policies, activities, and fees to battle negative interest. Questions that the research answers are the following:

> Question 1: *Has the ratio of banks' net interest income to total revenue changed in the period of 2010-2020?*
>
> > Question A: *Did banks cut expenses to make up for possible loss in profit?*
> >
> > Question B: *Have banks increased fees to battle possible loss of income?*
> >
> > Question C*: Has the most important source of income changed due to NIRP?*

1.3 Limitations

This research is limited to the analysis of banks that have been affected by NIRP in the Nordics, thus the results should not be generalized nor applied to other banks than what have been mentioned, as there are numerous influencing factors affecting banks' operational models. Banks included in this research are evaluated and analyzed as entities, since the data accumulation of every branch would not fit within the time restrictions of this research, nor banks publish such detailed financial reports. Other limitations include possible currency exchange calculation inaccuracy, as the data gathered in other currency than euro (€) is changed to euro by yearly average of euro foreign exchange reference rate.

Possible missing or partial information in annual reports is also considered, thus the results should only be interpreted within the restrictions of this scope, as the research only examines seven banks in the Nordics affected by NIRP. This research may give an indication of what is affected by NIRP in the banking industry but by no means does it cover the impact that NIRP has had on the financial system and the macroeconomy.

2 THEORY

The aim of the following chapters is to provide background knowledge on negative interest as a monetary policy tool, as well as provide the needed information for understanding the empirical part of this research.
Each Central Bank introduced NIRP at different times (*see Figure 1.*) for different reasons. It is important to acknowledge that negative interest rates vary in each bank, as Central Banks use different policy and interest rates to influence the main monetary variables[1]. Monetary variables are influenced because the policy rate set by Central Banks determines the rate at which banks obtain money from them, which influences the level of interest on services and products in banks. (Policy Interest Rate (%), 2019)

These different policy interest rates include overnight lending and discount rate, maturity repurchase rate, rate on certificates of deposits (CD) and Central Bank fixed repo/reversed repo rate (Central bank policy rates, 2021). By fluctuating policy interest rates, Central Banks can depreciate currency, curb, or accelerate inflation and boost economic activity (Policy Interest Rate (%), 2019). Figure 1. shows an overview of each Central Banks' monetary policy interest rates from the year 2010 to 2020. The changes see are explained in later chapters, as various rates affect the monetary policy rates.

[1] Monetary variables are factors that affect the economy, these can be consumer prices, credit expansion (dept monetizing) etc. (Policy Interest Rate (%), 2019)

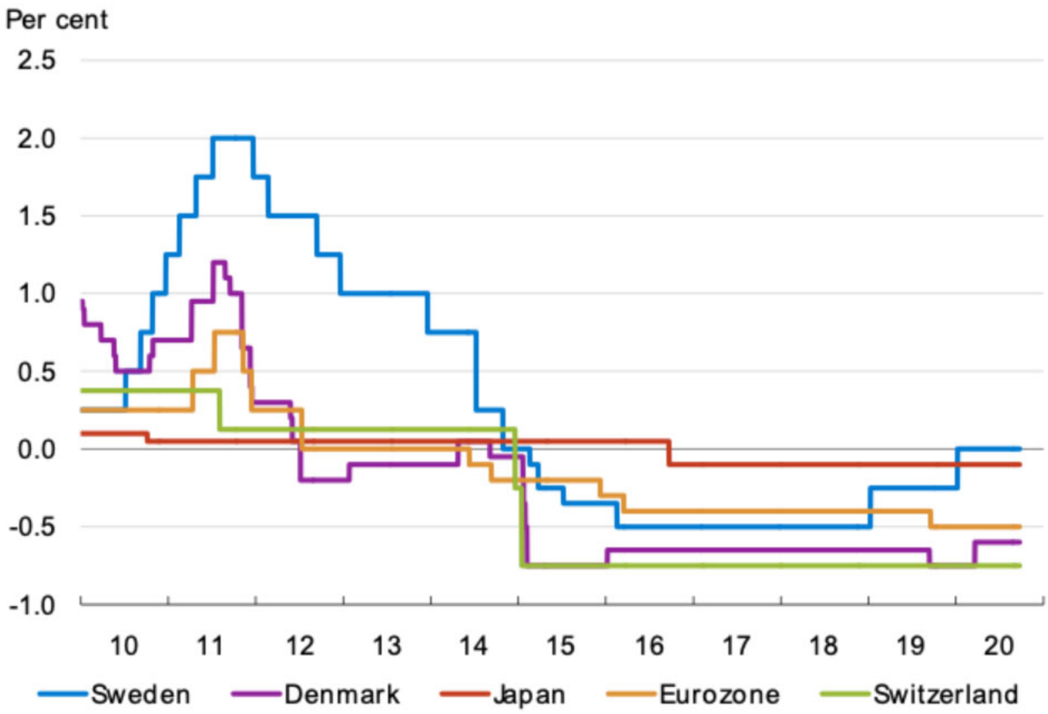

Figure 1. Monetary policy interest rates in countries with negative interest rate policy (Refinitiv DataStream, 2020, as cited in secondary source (Krogstrup, Kuchler and Spange), 2020)

2.1 Previous Research

There are studies on the change of profitability of the banks during low and negative interest rates that touch up on the ways banks have changed their ways of operating since the introduction of negative interest rates. However, many of these studies have the aim of finding out whether the profitability of the bank has experienced changes since the introduction of negative interest rate policy, whereas this particular study seeks to also explain the changes in the operations banks have made in order to stay as profitable as it can in the environment of NIRP.

Researchers such as Selva Demiralp, Jens Eisenschmidt and Thomas Vlassopoulos (2017) have studied the change of profitability of 205 Euro banks after the introduction of NIRP in 2014 and touched up on the affect it has had on banks' products and the way of operating. Demiralp et al. (2017) state that the actions of banks during negative interest differ depending on the characteristics and primary activities of the bank. The research of

Lopez, Rose, and Spiegel (2018) support the findings of Demiralp et al. (2017), furthermore Lopez at al. (2017) state that banks relying highly on deposits are more vulnerable to loss than those banks that rely less on deposits due to non-interest income reliance.

According to Demiralp et al. (2017) during NIRP wholesale banks tended to rise the share of government bonds, while banks that are relying more on deposit funding than any other activity extended more loans to battle negative interest rates. Investment banks battled the negative rate introduction by reducing excess liquidity. However, researchers note that the true identification of NIRP's impact on banks is not as easy, as other policies such as ECB's Asset Purchase Program (APP) and Targeted longer-term refinancing operations (TLTROs)[2] were introduced quickly after June of 2014 and may have influenced the operations of banks. (Demiralp et al., 2017)

Lopez et al. (2018) researched more than 5100 banks with different currencies in Japan and EU from 2010 to 2016. They have concluded that banks have not suffered large losses after the introduction of negative interest rates, since negative interest motivated banks to develop new products, services and focus on gains from non-interest income. The study of Lopez et al. particularly focused on the level of the yield curve and the changes caused by NIRP. It was found that a negative nominal interest rate increased bank lending while lowering banks' liquidity buffers[3], and the amount of cash held by banks decreased by 2.5 percentage points due to reduced liquid deposits with Central Banks.

Though both Lopez et al. and Demiralp et al. have touched on the changes of operations banks have made during NIRP, neither of their research investigates in detail which key performance indicators are affected the most financially, and how banks adopted to NIRP.

Senior economist of economics and finance at IMF Rima Turk (2016) has also done research on the effect of negative interest rates on bank profitability. In her research she

[2] Eurosystem's operations that offer long-term funding to banks in order to increase bank lending to real economies. (TLTROs, 2021)

[3] Liquidity buffers are a reserve of liquid assets that enables the bank to meet both, unexpected and expected cash flows (e.g., Deposits) without any inconvenience to the operations of the bank. (Q&As on Statement Regarding the Use of Capital and Liquidity Buffers, 2021)

focused on Swedish and Danish banks, concluding that banks (Swedish and Danish) battled impacts of negative interest rates with reduced funding costs and by increasing variable fees. (Turk, 2016)

Turk conducts her research by stating that bank profitability during negative interest have been stable, which supports the findings of Lopez at al. (2018) and Demiralp et al. (2017) that banks have not suffered from particularly large financial loss during NIRP.

2.2 Monetary policies and negative interest rate

In 2008 the global financial crisis (GFC) drove the whole world into recession. According to Blinder (2013) the financial structure weakness (lack of supervision and regulation), excessive dependance on unstable short-term funding and poor risk management in the US were major factors whose vulnerability ensured the occurrence of the GFC to happen. Arestis et al. (2010) in their book "*The Financial Crisis: Origins and Implications*" say that the bankruptcy of Lehman Brothers was the triggering factor for GFC.

As a consequence of the Great Financial Crisis, various Central Banks have introduced different unconventional monetary policies (Bech and Malkhozov, 2016). According to Arteta, Kose, Stocker and Taskin (2016) these unconventional measures include asset purchase programs, credit easing and forward guidance on monetary policies. An additional policy implemented by ECB is "Targeted longer-term refinancing operations" (TLTROs) (Pankki, 2021).

These measures were taken to ensure the needed additional monetary stimulus, however with the inflation not meeting the wanted target, hoarding of excess reserves by banks and the perception of even stricter limitations on easing policy over a prolonged period had Central Banks apply a necessary new policy: the negative interest rate policy. (Arteta et al., 2016)

Even though the target of introduction of unconventional policies (including NIRP) was to ensure monetary stimulus, the motivation behind the implementation of such policies and measures differed for Central Banks. In the following chapters each implementation is discussed in greater detail, with the motivation behind the introduction of negative interest rates elaborated for each Central Bank.

2.2.1 Negative interest in Denmark

Central Bank of Denmark "Danmarks Nationalbank" introduced negative interest rate in July of 2012, which makes Danmarks Nationalbank the first Central Bank to enter negative interest rate *territory* of those Central Banks relevant to this research.
Although, Sweden's Central Bank *Riksbank* did lower its interest rate on its deposit facility to -0.25 per cent in July of 2009, the monetary policy rate remained above zero until February of 2015 due to close linkage to repo-rates (Jørgensen and Risbjerg, 2012; Andersson and Jonung, 2020). Meaning "Danmarks Nationalbank" is the first Central Bank to enter negative interest rate territory, but not the first Central Bank to introduce negative interest rate.

The decision to introduce negative interest rate by Central Bank of Denmark was made as a response to ECB lowering its interest rates and done by reducing the certificate of deposit rate (CD) to -0.20 per cent. (Monetary review, 3rd Quarter 2012, 2012)

According to the monetary review of the 3rd quarter of 2012 done by Jørgensen and Risbjerg (2012) the reasoning behind the introduction of negative interest rate in 2012 was to maintain fixed-exchange-rate policy of Denmark. The introduction of such policy ensured the stabilization of Danish krone against euro and meant that monetary-policy counterparties[4] had to pay for liquidity placing in CD (Jørgensen and Risbjerg, 2012). Introduction of NIRP was also a way to reduce the interest-rate spread between the euro area and Denmark (Jørgensen and Risbjerg, 2012). According to Krogstrup, Kuchler and

[4] In Denmark monetary-policy counterparties are the ones that have the right to use monetary-policy instruments (Monetary-policy instruments, 2021). Such counterparties include banks, credit institutions and mortgage institutions. Some of monetary-policy instruments at their use are overnight deposits and 7-day deposits but only against the purchase of certificates of deposit.

Spange (2020) Denmark's monetary policy rates' aim is to sustain exchange rate to euro as fixed and stable as possible.

However, 2012 was not the first time Denmark introduced negative interest rates. Previously this occurred in 2009 and 2010, when Danmarks Nationalbank introduced negative deposit rates with Sweden's Central Bank Riksbank deposits. At that time, the sums that amounted as a result were so small that they did not reach negative market rates, thus had no major effect on economy nor the policy interest rates. Interest rates have been below zero briefly also in 2011, when Danish Treasury bills, particularly short-term were popular among foreign investors. (Jørgensen and Risbjerg, 2012)

Since the introduction of NIRP in Denmark, interest rates have been somewhat stably negative until April of 2014. According to Hüttl (2014) in January of 2013 Danmarks Nationalbank increased deposit rate to -0.1 per cent from the previous -0.2 per cent due to reduced strengthening of Danish krone to euro rate, and in April of 2014 Danmarks Nationalbank increased its CD to +0.05%. However, in January and February of 2015 Danmarks Nationalbank pushed interest rate on CD's back to negative with -0.75 per cent, motivating the decrease with defending the krone's peg[5] to the euro (Jensen and Spange, 2015).

In August of 2019 negative interest rates in Denmark reached yet another milestone as Jyske Bank introduced negative deposit rate of -0.75 per cent for its clients with more than 750,000 Danish crowns of deposits (Skydsgaard, 2020). Shortly after other banks of Denmark, Nykredit, Nordea and Dankse Bank and Sydbank followed the steps of Jyske Bank and introduced negative deposit rate to their clients (Negative interest rates on deposits: New normal in Denmark, 2020).

In May of the following year, Jyske Bank carried out yet another change to NIRP and lowered the amount charged with negative deposit rate from 750,000 to 250,000 Danish crowns. Chief Executive of Jyske Bank, Anders Dam motivated the change of the sum

[5] Currency pegging means attaching nations own currency to the currency it trades or deals the most. This ensures safer more stable investing and trade environment for both parties. (Pegging, 2021)

exempted from negative interest by decline in net interest income over the past year. (Skydsgaard, 2020)

NIRP introduction in Denmark has divided opinions as pros and cons of it are argued. Krogstrup et al. (2020) mention a forthcoming study done by Andreas Kuchler and Kim Abildgren about Danish non-financial companies. According to Krogstrup et al. (2020) the study concludes that the willingness to invest and employment both rise when the operating bank of the company introduces negative interest. On the other hand, negative interest rate in retail banking has raised some concerns. Danish Minister for Industry, Business and Financial Affairs, Simon Kollerup has expressed his worry about retail bank customer fees on deposits to Bloomberg (2021). Kollerup's concern is that paying for keeping money in banks will become normal (Buttler, 2021). The minister's concern is understandable, as negative interest in retail banks can lead to consumers hoarding money, thus further worsening the situation of the economy (Buttler, 2021).

2.2.2 European Central Bank and negative interest

The main aim of the monetary policy of European Central Bank (ECB) is to maintain price stability to create economic growth and job creation (Primary objective, 2021). In "Definition of price stability" (2021) it states that, ECB ensures price stability by adjusting the inflation rate, that is close to, but not over 2%. By adjusting the inflation rate, ECB avoids inflation that is persistently too low, but also an inflation that is persistently too high. This margin of inflation keeps the risks of deflation low and ensures economic growth (Definition of price stability, 2021).

Whenever inflation gets too high, the European Central Bank increases the interest rate, making saving money more attractive than borrowing; alternatively, when inflation gets too low ECB reduces interest rates for borrowing and spending sound more attractive for clients (The ECB`s negative interest rate, 2014). These measures of changing the interest rate affects Central Banks of Eurosystem, since the monetary policy of the Eurosystem is regulated by the ECB (How the Economic and Monetary Union works, 2021).

In June 2014 European Central Bank (ECB) introduced negative interest rate policy (NIRP) with reducing the deposit rate to -0.10 per cent. The aim of reducing deposit rate was to restore inflation (*see Figure 2.*) back to the ECB's price stability target. (Jobst and Lin, 2016).

Since the introduction of NIRP in Eurozone, monetary policy interest rates have been rigidly negative as seen in *Figure 1*. ECB's negative interest rates have not had as big of an impact on the economy of Eurozone as Danmarks Nationalbank's pushes in Denmark, mainly due to the less severe negative interest rates. In the following chapter the negative interest rates of Finland are discussed to further provide the understanding of the affects it has had on the banks covered in this study.

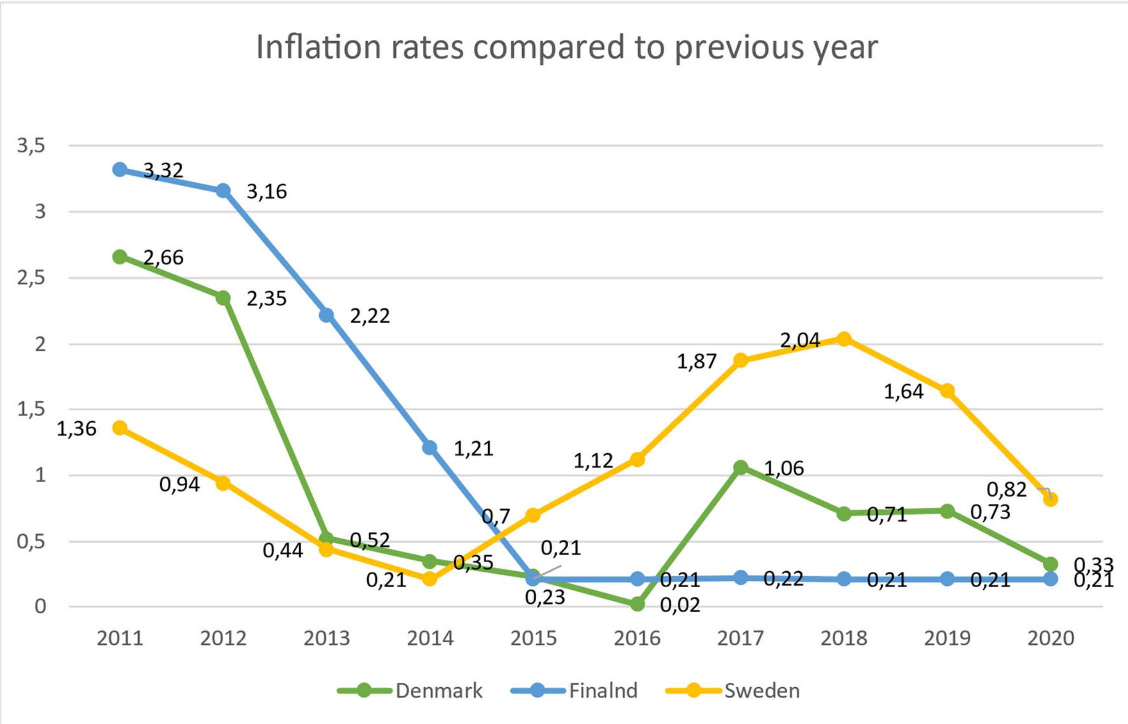

Figure 2. Inflation rates compared to previous year (Statista, 2021).

Shows the inflation rates of the period when negative interest rates became tempting for Central Banks.

2.2.3 Negative interest in Finland

Nyman (2020) in her Banking Regulation guide states that the banks of Finland are under direct supervision of Finnish Financial Supervisory Authority (FIN-FSA), which regulates and supervises the stability of the financial markets in Finland. FIN-FSA also ensures the implementation of international regulations, as it is a part of supervision of the financial sector in the European system (Nyman, 2021). The supervision of European banks (including Finland's) is controlled by the Single Supervisory Mechanism (SSM), which FIN-FSA is a part of, making Finnish banks supervised by not only by FIN-FSA directly, but also by ECB (Single Supervisory Mechanism, 2021). In other words, the ECB's monetary policy is too affecting Finnish banks (About, 2021).

Unlike Danish banks, Finnish banks have not yet collected interest from retail bank customers. According to FIN-FSA, there is no direct legislation in Finland that would prevent retail banks from charging customers of deposit interest, but as there are other agreements in place - such as deposit and payment account agreement - it would be unethical to do so (Charging negative interest rates on consumer customer deposits, 2019). Aino Nuotio (2020) in her research for Helsingin Yliopisto mentions that the regulations that are now in effect do not provide an answer as to whether the change in condition of charging negative interest rates of retail bank customers will be substantively acceptable. She also states that the customer in Finland is protected by consumer and contract law regulations, and constitutional property protection, making the introduction of negative interest rates to retail bank customers highly doubtful (Nuotio, 2020).

Even though Finnish banks are not yet charging retail bank customers with negative deposit rates, institutional clients have been introduced to such charges. In December of 2015 Nordea issued a statement, where Petteri Änkilä stated that the costs of negative interest are *not* sustainable for banks over a prolonged period, thus Nordea would start charging deposit interests on the accounts of some institutions from January 1st of 2016 (Negatiiviset talletuskorot Suomeen, 2015). OP has also begun to charge its institutional clients with negative interest rates for income on deposits (OP Corporate Bank plc's Report by the Board of Directors and Financial Statements 2020, 2020).

In an interview with Yle regarding the introduction of negative deposit rates to institutional clients, Veli-Matti Mattila noted the following: “Each bank makes its own decisions” (Mattila, 2019). This means that banks can individually decide on what is the most profitable strategy for them. Moreover, Mattila stresses that banks cannot discuss the issue of negative interest rate charges together, as this is a competitive issue. But that decision can be profitable for the bank in some way (Karismo, 2019).

2.2.4 Negative interest in Sweden

In July of 2009 Sweden’s Central Bank Riksbank lowered the interest rate on its deposit facility to -0.25 per cent, making Riksbank the first Central Bank to introduce negative interest rates (Jørgensen and Risbjerg, 2012). Despite the deposit facility rate of Riksbank remaining negative until September 2010, the monetary policy rate remained above zero until February of 2015 due to close linkage to repo-rates (*see Figure 1.)* (Jørgensen and Risbjerg, 2012; Andersson and Jonung, 2020).

In February 2015 Riksbank reduced its repo-rate (the main policy rate) to -0.10 per cent, further lowering it to -0.50 per cent in 2016 (Andersson and Jonung, 2020). The aim of these measures was to bring the domestic inflation rate to its desired target of 2% (Account of Monetary Policy 2019; The Riksbank’s experiences of a negative repo rate, 2019). The inflation rate of 2% was met between 2017 and 2018 (*see figure 2.),* thus Riksbank’s repo-rate was again raised to −0.25 per cent, and further again in December of 2019 to zero per cent.

Achieving the main aim of implementation of NIRP in Sweden, Riksbank was the first Central Bank to leave negative interest territory (Account of Monetary Policy 2019; The Riksbank’s experiences of a negative repo rate, 2019). However, according to Andersson and Jonung (2020), the economy of Sweden is highly dependable on the economy of Europe, thus the inflation rate increase is not only due to unconventional monetary policy, but also is due to economic condition improvement in euro area.

2.3 Profit and profitability of banks

According to Howells and Bain (2014) the role of the banks in our society is broad, as they provide numerous of services and functions. Casu, Girardone, and Molyneux (2015) state that banks are the biggest money suppliers in countries, thus play a major role in each country's economy. Banks take deposits, grant loans, and manage other matters related to payment transactions (Casu, Girardone, and Molyneux, 2015). In addition, money and currency trading is a key part of the banking business, as is asset management services, investment, financing, and advisory services (Howells and Bain, 2014).

Casu, Girardone, and Molyneux (2015) say that customer deposits are one of the main sources of funding for traditional retail banks. This becomes evident when glancing at the balance sheet structure. Banks invest retained profits into loans, fixed assets, and other investments, to maximize profits by charging and receiving interests. However, banks cannot invest nor spend all their profits, as they are obligated to keep a reserve for clients to withdraw their deposits at any time (Howells and Bain, 2014).

The revenue of the banks consists mainly of the difference between interest on assets and interest on liabilities. The assets and liabilities of banks are tied to various interest rates, these can be either fixed or variable rates (Casu, Girardone, and Molyneux, 2015). Thus, with the introduction of NIRP, banks' profits have been vulnerable, especially if they hold a large amount of fixed-rate bonds in their possession.

Jansen and De Haan (2003) mention that some banks suffer from cost-to-income ratio inefficiency, which can lead to lower profitability. Their research concludes that efficiency is one of the many variables that can lead profitability of the bank (Jansen and De Haan, 2003). Research of Huljak, Martin and Moccero (2019) second that, as they find that the efficiency of euro are banks has only averaged to 84% in the years 2006-2017, which led to dropping of productivity factor median of euro banks. According to Huljak et al. (2019) productivity of euro banks dropped form 2 per cent in 2007 to only around 1 per cent in 2017, leading to decreased financial stability and profitability of these institutions (Huljak et al., 2019).

2.4 Financial statements

Danish, Swedish, and Finnish banks use IFRS standards (IAS 1) for reporting financial statement, as the jurisdiction profile of each country states that all domestic companies that trade securities in a regulated market (which includes banks) must report according to IRFS standards accepted by the EU (Denmark, 2021; Sweden, 2021; Finland, 2021). Financial statement done accordingly to *IAS 1* financial statement presentation requirements must include a statement of profit or loss and other comprehensive income (OCI), financial position, changes in equity and of cash flows (IFRS - IAS 1 Presentation of Financial Statements, 2021).

During years 2010-2020 International Financing Reporting Standards have been amended more than 13 times (IFRS - IAS 1 Presentation of Financial Statements, 2021). Most of the changes made have made minor impact on IAS 1, however few of the amendments have significantly impacted reporting of financial institutions. In 2012 changes were made to the way other comprehensive income (OCI) needs to be presented (IFRS - IAS 1 Presentation of Financial Statements, 2021). These changes have impacted all researched financial institutions; thus, it may contribute to some differentiation of the data accumulated.

As mentioned above, banks' most important sources of income are customer deposits, loans, investments, and various fees they generate from asset management services, investment and financing consulting services, and advisory services (Casu et al., 2015). Financial statements done accordingly to IAS 1 include calculations and predictions of these factors, which makes it possible to study the trends and changes NIRP has had on banks' way of operating with higher accuracy.

Key factors from financial statements have been selected for evaluation to provide knowledge regarding the changes banks may have stumbled upon as well as answer the research questions stated below.

Question 1: *Has the ratio of banks' net interest income to total revenue changed in the period of 2010-2020?*

Question A: *Did banks cut expenses to make up for possible loss in profit?*

Question B: *Have banks increased fees to battle possible loss of income?*

Question C*: Has the most important source of income changed due to NIRP?*

The key factors chosen for closer examination are: Net interest income (NII), Profit, Net commissions and fees, Personnel costs, Total liabilities, Total assets, more specifically ash and cash equivalents, and Other operating expenses as they can provide with additional information of the effect NIRP has had. Other factors such as net interest expenses, other income, depreciation, and different expenses are also considered in this research, but these will only be looked at briefly, as they are not the main factors selected for evaluation.

NII consists of the bank's funding and lending operations. It constitutes the difference between the interest received and paid by the bank (Definition of 'Net Interest Income (nii)', 2021). NII is formed when a bank pays less interest on its loan than what it itself receives by issuing a loan. With the introduction of NIRP, NII has been challenged, thus forcing banks to unconventional measures like charging negative deposit rates from clients. Ratio between NII and profit can provide insight as to how well banks have adapted to NIRP.

Other factors that are chosen, are mostly used to count income distribution to see possible new trends. Overall profitability also needs to be examined, to help understand the sphere of consequences NIRP has had, although profitability is not the main research question.

3 METHODOLOGY

This chapter discusses methods and the materials that are used to conduct this research. The purpose of the following chapter is to present the used methods in detail and indicate why selected methods are the most relevant ones for this specific research; additionally, possible pitfalls are highlighted. This chapter also includes bank selection and material collection processes.

The research steps are as follows: firstly, quantitative data is collected, after which it is followed up with qualitative data results, such as knowledge/theory obtained from various publications and annual reports. Qualitative results help explain the results obtained from quantitative data.

3.1 Method choice

The aim of this research is to find out what changes banks have made in operations to battle the negative interest rate consequences if such have occurred, thus mixed research method is selected for this research to best assist with the evaluation of the financial (quantitative) data and integration of qualitative data into quantitative results, to better understand the findings. Quantitative data alone could not conclude how banks adapted to negative interest rate; thus, qualitative research is also needed. The qualitative and quantitative data are further elaborated on in chapter 3.3.

The mixed method design that is used in this research is “Concurrent Embedded Design”, which presents the possibility of understanding the research questions better through additional research of qualitative data (Bergman 2008, Chapter 5, Section 2, para.2). The need for mixed method is supported by Greene, Caracelli and Graham (1989) and Creswell (2020) writings about methodology.

According to Greene et al. (1989) mixed methods can be complimentary to research, as research data obtained from one method can either, compliment, elaborate or enhance the data obtained from the opposite research method. Creswell (2020) elaborates on these findings and describes mixed methods research design as integrating the results of qualitative research with the results of quantitative results.

However, some pitfalls are to be mentioned about the use of mixed method. According to Bryman et al. (2011) many researchers argue that the mix of qualitative and quantitative methods is both, theoretically and ontologically prevented from achieving. Bryman also notes that the use of mixed methods is time-consuming and may bring competitive results. Nonetheless, in order to understand the data accumulated from quantitative research, mixed method is necessary to conduct.

These pitfalls are considered and prevented to the best ability by comprehensive descriptions of the theory, method, selection process, research setting, previous studies, and the background. The arising of competitive results can be explained by the possible restrictions set by the banks to their employees, or by the lack of transparency in the reports provided by the banks. However, since the design used for this research is the concurrent embedded design, the arising of competitive results is minimized. This is because qualitative research is done after the findings of quantitative research, which presents the possibility for the qualitative research to be fully based on the quantitative findings. This way qualitative data supports and elaborates on the findings of quantitative research.

3.2 Sample selection

As this research has limitations to its timeframe and length, the number of banks included needs to be restricted. The banks for this research are chosen by simple random sampling. Bryman and Bell (2011) state that simple random sampling process limits the possibility for subjectivity in selection process and gives every subject of population an equal chance to be included.

According to Bryman and Bell (2011), the first and second steps of simple random sampling are to “define the population” and “Select or devise a comprehensive sampling frame.” (p.179). The population of which the banks are chosen from is defined by the requirements below. These requirements provide better understanding of the differences and equivalencies in the data accumulated, as the data is provided within the same framework of IFRS. These also succeed with limiting the population to earlier stated demarcations in chapter 1.4.

The chosen banks fill the next requirements:

1. *The bank is under the supervision of ECB (credit institution or a branch) and/or has memorandum of understanding*[6] *between ECB and its supervisory authority.*
2. *The bank follows IFRS requirements for financial statement.*
3. *The bank operates in the Nordics.*
4. *Has minimum of 100m € of total income as of 2020.*
5. *Been affected by negative interest rates.*

The list of the banks that fit these criteria (except 4) and is used for this research is from ECB Banking Supervision's "List of supervised entities" (2021). As ECB describe, ECB Banking Supervision publishes different statistics on significant institutions, this list is published on their behalf. (Banking supervision, 2021). The list is further limited to fit the 4th criteria.

Third step of simple random sampling according to Bryman et al. (2011) is to elect the size of the sample. This research focuses on 7 banks that fit the criteria above, as it gives a better understanding of the possible trends of battling negative interest rate.

Each of the bank is numbered and selected randomly with "*RANDBETWEEN*" function of Microsoft Excel, as per Bryman et al. state in their book "Business Research Methods" numbering and selection are the following steps after the size election.

The banks that are randomly selected for this research are: Jyske Bank, Nordea, Skandinaviska Enskilda Banken AB (SEB), Swedbank AB, Svenska Handelsbanken AB (SHB), Danske Bank and OP.

[6] MoUs is a framework for cooperation with international authorities, both in and outside the EU. (Memoranda of understanding, 2019)

By using simple random sampling method, every unit has an equal amount of chance to be included in the research, making the research unbiased (Bryman and Bell, 2011). However, the disadvantage of simple random sampling is the time required to acquire the needed list of population and possible absence of some units. (Bryman and Bell, 2011)

3.3 Data collection and content analysis

This research focuses on analyzing different publications of banks to answer the research questions. Information and data for this research is collected from banks' own websites, ECB websites, interviews with employees of the banks and from previous studies. Some additional data is acquired through statistic providing services, such as Statistics Finland, Statistics Sweden, and Statistics Denmark. Because all the selected banks are not on the same stock market or under supervision of the same institution (fully), data could not be collected from one source, which can lead to missing or partial data and information.

3.3.1 Quantitative data

The focus of this research is on financial statements and balance sheets as both quantitative and qualitative data acquired from them indicates possible changes in the ways of operating.

The quantitative (financial) data for this research is collected from annual publications made by each selected bank from the year 2010 to 2020 (the most recent). These publications include financial statements, annual reports, balance sheets, different announcements, and presentations. The timeframe of 2010-2020 is chosen to best showcase the effect of negative interest rates. This timeframe includes years before and after the introduction of NIRP, thus it is possible to conclude whether there have been changes in operations of banks after NIRP.

This research is closely observing the changes in net interest income and total operating income, to see possible changes NIRP has had on net interest income and overall profitability. Commission income, staff costs and other expenses are also observed, to see possible trends of increasing service fees with the expense of layoffs etc. These “smaller indicators” provide an overview of possible operational changes, that were made to battle negative interest rates.

Possible pitfalls of this research are vague annual reports, with little data and information. This is taken into consideration; interviews with bank employees are asked to elaborate on the vague information. Another possible pitfall may arise in quantitative research, as the currency used in the banks’ reports is not the same. However, the research uses an average of currency exchange to each assigned year, to limit the possible mistakes. This is noted in the results and discussion, as the results are directive and cannot be portraited as is.

3.3.2 Qualitative data

Publications of the banks and interviews provide the needed additional qualitative data for this research’s quantitative data. This data and interviews elaborate and explain the findings of quantitative (financial) data, and properly explain the factors behind the changes, trends, patterns, and themes. Qualitative data also makes it possible to rule out findings that are not researched in this study. These finding may include key factors that changed due to other economic factors than the introduction of NIRP. This makes the research more reliable and focused, thus providing with answers to only the research questions. All the findings are discussed later in Chapter 4 (Results) and 5 (Discussion and conclusion).

3.3.3 Publications of the bank

Annual reviews, reports, different announcements, and presentations give information on what might have influenced each key indicator stated in balance sheet and financial statement. These are used to find explanations to the finding of quantitative research. Quarterly reports and reviews are used for more in-depth observations but are not the preliminary source.

3.3.4 Interview data

Interviews are conducted via Teams Meetings and are held separately for each participant. The two participants are employees from different banks and work on different levels. First interview is conducted with former Chief Economist of Nordea (X) and the second interview is with Y, the Head of Regulatory Affairs in OP. Y also worked for Bank of Finland, The European Banking Federation and Federation of Finnish Financial Services. Interviews consist of open-ended question, as well as some specific questions targeted at each bank. Consent to publish the information retrieved from interviews has been given from each participant during the interview, however, to prevent identities of the interviewees undisclosed interviews will not be published publicly, nor the identities of interviewees will be disclosed.

Questions such as “Did negative interests affect your work?” and “Where there any changes made in the funding?” provide an overview of how the banking sector battled the additional costs of negative rates, nevertheless, these questions are not in high importance to the research itself. Questions providing validity to quantitative data findings are following; “What key indicators were affected the most by the introduction of negative interest rates?”, “What moves did your entity was forced to make when NIRP was introduced, if any?”, “Were there concrete changes in operating ways of banks, e.g., fee and commission changes?”.

These also help to allocate which acquired data from the quantitative analysis should be looked at more closely and analyzed with greater detail. Nevertheless, it is considered, that employees may not answer all questions, and some questions might be answered vaguely. Possibility for subjectivity and bias is also to be considered, thus the research does *not* rely on qualitative data alone. Interviewees are also asked questions based on the data, with the hopes to provide validity to the finding already made.

3.4 Instruments for analysis

The main measurement instruments used in this research are Microsoft Excel and SPSS. These applications make the examination of variables (key indicators) less vulnerable to mistakes and provide a handful of tools for thorough analysis. Correlations and differences are easily calculated with these programs.

Both MS Excel and SPSS provide the possibility to analyze the findings horizontally and vertically. This means that the variables can be compared between banks, but also between years.

3.5 Validity, reliability, and manipulation of data

The data included in this research is taken from annual publications of each bank from the year 2012 to 2020. As mentioned earlier, all banks chosen are either under direct supervision of ECB or the Supervisory Authority of the chosen bank has memorandum of understanding (MoUs) with ECB. This means that the branches or subsidiaries of the chosen banks are supervised by Supervisory Authority, which agrees with ECB to share information within a specific framework and cooperate. (Memoranda of understanding, 2019)

According to article “Memoranda of understanding” (2019) published by European Central Bank, MoUs allows for transparency and cooperation within a framework. To conclude, this means that at least some part of the publications and data of banks that are not directly supervised by ECB are checked by ECB for possible improper recordings. Meaning that each publication of chosen bank is supervised by not only the national Supervisory Authority, but also by assigned Supervisor from ECB, whose main mandate is to supervise the national Supervisory Authority.

Trustworthiness is maximized through transparency sought throughout the entire research process and a proper introduction of methods and materials used. Possible bias and subjectivity are mitigated by focusing on finding patterns, trends, and themes. The grouping of the finding into previously mentioned categories ensure that all findings are elaborated on.

Interviews are recorded for further examination. Data will not to be published publicly as is, as it violates the rights to be anonymous. Transcription of the data eliminates unnoticed information, making the study more reliable.

An aspect worth considering regarding the trustworthiness and reliability of this research is data accumulation methods and its manipulation. As mentioned in Chapter 1.3 currency exchange calculations inaccuracy may appear as only year average exchange is used in this research. IFRS changes and amendments are also to be considered as data manipulation, as the financial data and its content changes under with the IAS 1. This was mitigated by using the latest possible financial data for the reporting year (e.g., banks include five-to-ten-year overviews in yearly reports, where all years are reported according to the latest IFRS standards.

4 RESULTS

Results and answers to the research questions are presented in this chapter. Discussion of findings, possible trends and patterns of data gathered is left for the next chapter for better understanding of the connectiveness of the qualitative and quantitative research done. Results presented in this chapter are framing the path to discussion presented later.

4.1 Answers to research question

As stated in *Chapter 1.2*, the main aim of this research is to find whether the way banks make money changed during NIRP, furthermore whether the biggest income source has changed and have banks made loss on interest income since the introduction of NIRP. The following answers to the research questions help to answer these broad questions by dividing the subject into smaller pieces.

Question 1: Has the ratio of banks' net interest income (NII) to total revenue changed in the period of 2010-2020?

As seen below in *Table 1*, the ratio of NII and Pre-tax profit exhibits a tendency of decreasing over the examined years. However, it is also evident that the years negative interest was introduced in each banks' regulatory area, the ratio of these factors dropped significantly more than other years. E.g., Danish Central Bank introduced negative interest in 2012, which is seen in data as a 383-percentage point drop for Danske Bank in the ratio of NII and Pre-tax profit. The same year Jyske Bank (which is also under regulatory legislation of Central Bank of Denmark) suffered a 178-percentage point drop.

Both, Jyske Bank and Danske Bank mainly operate on home soil in Denmark, however as Danske Bank has branches in other Nordic counties, it has also been affected by NIRP implementations of Sweden's Central Bank as seen in *Table 1, (Dankse Bank, year 2015)*;

A decrease of 72-percentage points occur in the following year of Sweden's implementation of NIRP. The same trend is visible in 2015, when ECB implements negative interest, when all banks except Danske Bank suffer ratio decrease.

This same behavior of decreased ratio is seen in each implementation year of NIRP, as banks' ratios tend to decrease exceptionally either the year of implementation or the following year. Glancing at *Table 1 below*, a pattern can be quickly established, ratio of NII and Pre-tax profit suffers significant drops during introductory years of NIRP, however the effect of the variable ratio is not only attached to negative interest.

Table 1. Ratios of Net interest income and Pre-tax profit of banks in the period of 2010-2020. Highlighted in red are seen the decreases of the ratio of NII and Pre-tax profit which occurred during NIRP. (Sourced from financial statements of mentioned banks.)

Ratio of NII and Income (pre-tax)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Jyske Bank	466,70 %	751,51 %	573,33 %	218,08 %	213,18 %	240,45 %	168,28 %	157,12 %	182,04 %	172,49 %	239,34 %
Nordea	141,77 %	153,82 %	137,73 %	134,23 %	124,19 %	105,51 %	104,97 %	122,26 %	113,61 %	204,35 %	152,38 %
SEB	140,57 %	113,03 %	123,88 %	103,86 %	85,42 %	90,76 %	126,04 %	95,83 %	77,05 %	92,19 %	126,69 %
Swedbank	164,03 %	123,28 %	114,54 %	113,82 %	107,69 %	112,87 %	99,59 %	101,18 %	95,01 %	106,43 %	160,03 %
Handelsbanken	144,46 %	142,80 %	152,45 %	147,44 %	141,81 %	135,48 %	135,43 %	141,57 %	142,13 %	147,44 %	156,97 %
Danske	557,88 %	792,89 %	409,92 %	332,36 %	441,70 %	187,66 %	127,50 %	113,60 %	147,16 %	201,79 %	446,03 %
OP	159,48 %	196,19 %	171,16 %	130,53 %	113,99 %	93,19 %	92,97 %	106,89 %	123,67 %	148,09 %	163,57 %
AVERAGE	**253,56 %**	**324,79 %**	**240,43 %**	**168,62 %**	**175,42 %**	**137,99 %**	**122,11 %**	**119,78 %**	**125,81 %**	**153,25 %**	**206,43 %**

To answer the research question above, the ratio has changed during NIRP, furthermore the ratio has decreased on average 47,13-percentage points, which can be a sign of banks' most important source of income (NII) becoming weakened. Nevertheless, profitability has remained stable, just as previous researchers of the topic Demiralp et al. (2017) state (*see Figure 3.).*

However, few exceptions lay in the findings as e.g., Danske Bank's pre-tax profit rose from 2014 to 2017 in total almost 2,5 billion EUR. Danske's Annual Report of 2015 states, that the increase in profit is due to lower impairments, cut expenses (see *Question A, Figure 4.*) and fee income increase. Meaning other banks may also compensate revenue decrease due to NIRP with other products, fees, and tools (see *Question A* and *B*).

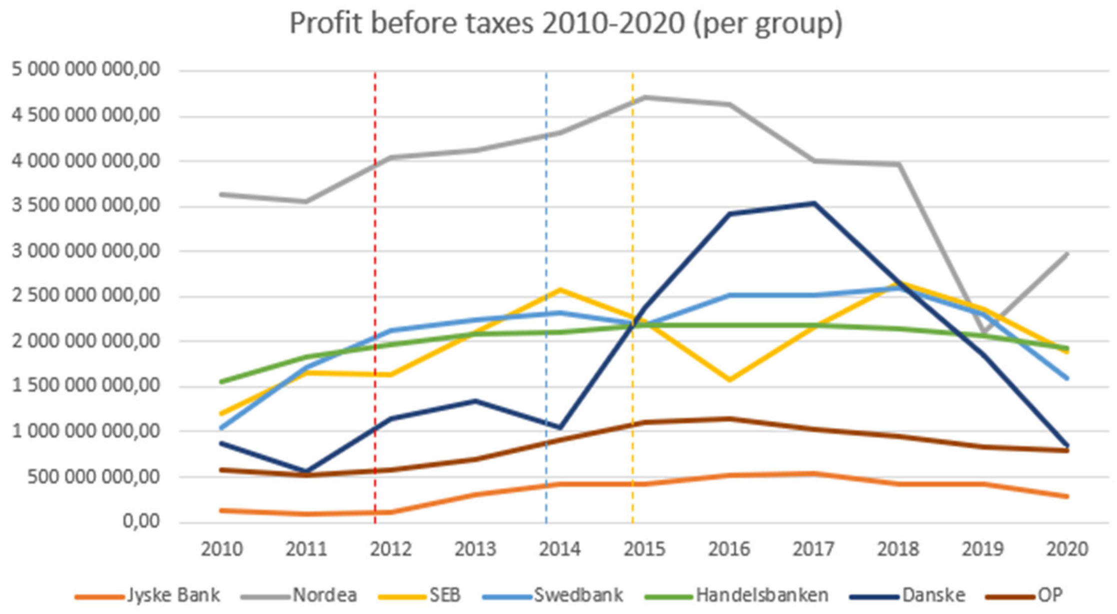

Figure 3. Pre-tax profit of each group selected for the research, with introduction years of NIRP shown vertically. (Sourced from financial statements of mentioned banks)

Question A: Did banks cut expenses to make up for possible loss in profit?

Although the loss from introduction of NIRP is visible on income statements of banks, data shows that banks made little changes regarding expenses, specifically operating expenses. As seen in *Figure 4.* banks managed to keep other operating expenses stable, without reserving to excess cuts. Few exceptions can be seen in the figure below as Jyske Bank's expenses increased by 29,68%, however this is explained in the Annual Report 2014 of Jyske Bank, the merger with BRFkredi, but also the reassessment of provisions both contributed to this change. Danke Bank's other operating expenses are the highest during years 2013 through 2017, which can partially be explained by Estonian branch money laundering costs. Another factor contributing to this is the flexibility of IFRS standards. Danske Bank includes costs such as personnel and administration costs, impairment charges for intangible and tangible assets before goodwill impairment charges, and amortization/depreciation of intangible and tangible assets in "other operating costs" when other banks don't. Nonetheless, this has been considered, as personnel cost have been deducted from the calculations of other expenses in Danske Bank.

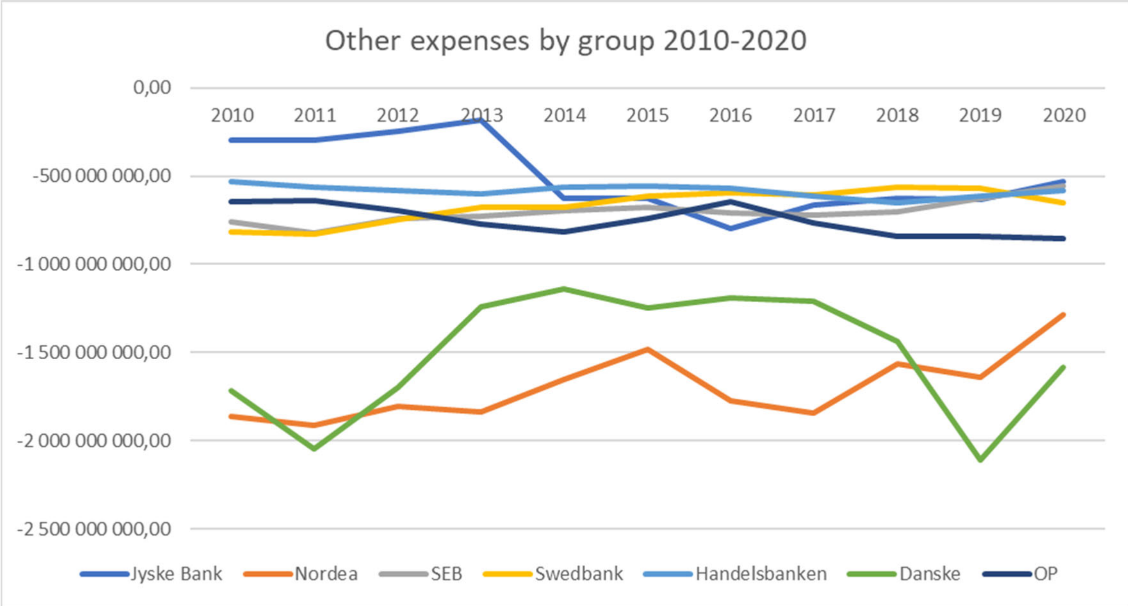

Figure 4. Other expenses by group from 2010 to 2020. (Sourced from financial statements of mentioned banks)

Figure 5. below shows personnel costs from 2010 to 2020, where no major changes can be seen. Nordea, which is the biggest group of all presented below had their personnel costs decreased from 2010 to 2020 by 28 million EUR, while all the other banks except SEB has increased their personnel costs on average by 219 million EUR. In the period from 2010 to 2020 SEB decreased their personnel costs by 32 million EUR.

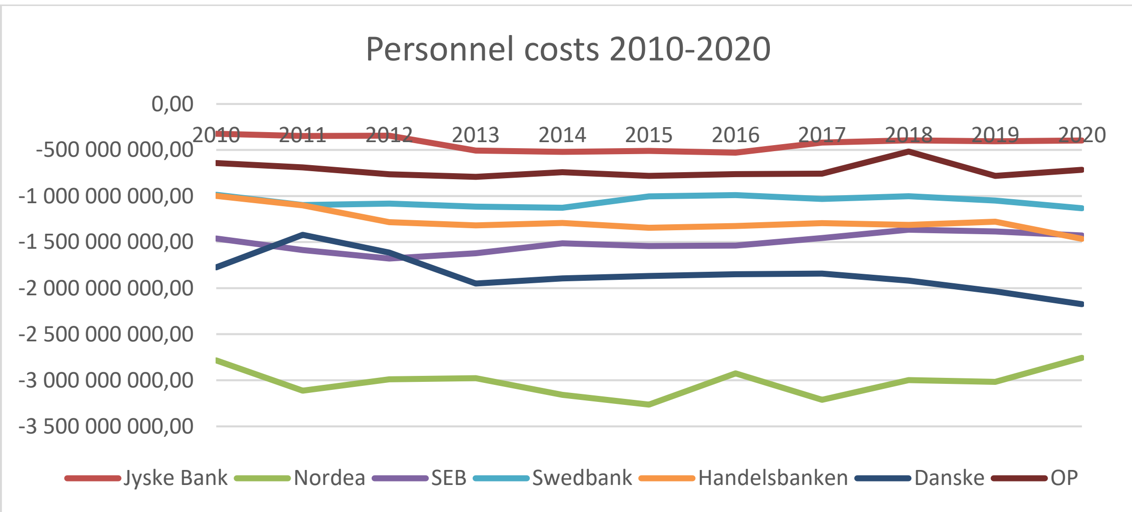

Figure 5. Personnel costs by group from 2010 to 2020. (Sourced from financial statements of mentioned banks)

Interest expenses of banks also decreased as banks became unwilling to hold excess reserves, which is what negative interest policy was introduced for (see *Figure 7.*) Unwillingness of excess reserves did not only decrease the expenses of banks, but also enabled more money into households. Such effect may lead to acceleration of inflation, thus stabilizing interest rates back to positive territory.

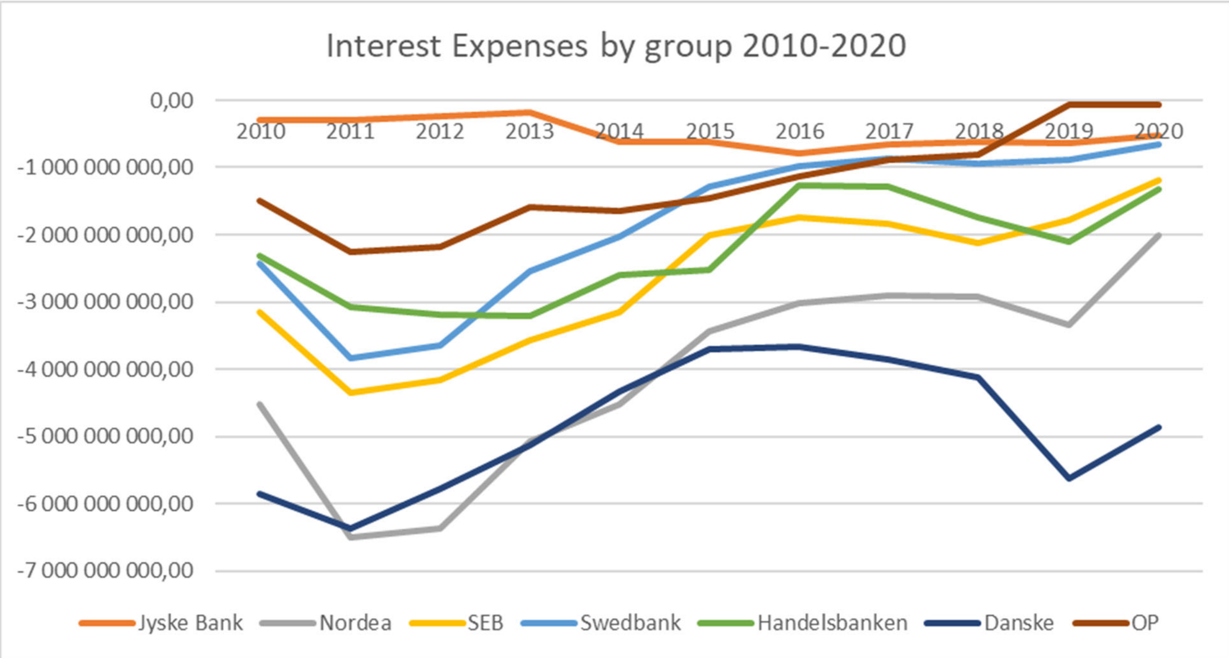

Figure 6. Interest expenses by group from 2010 to 2020. (Sourced from financial statements of mentioned banks)

Question B: Have banks increased fees to battle possible loss of income?

In Danske Bank's Annual Report of 2015, it is mentioned that in Denmark, Sweden and Finland negative short-term interest rates and the declining rates of other markets put distress to net interest income, which was partially offset by lowering loan impairment charges and higher net fee income (Annual Report 2015, 2016). *Figure 6.* below, shows that during NIRP implementation years, which are 2012, 2014 and 2015 slight increase in Net commissions and fees can be seen. Nonetheless, a trend of increasing fees can be seen as on average the net commission and fees increased by 248 million EUR from 2010 to 2020.

Nordea's 2015 Annual Report states that their way of battling negative rates was to develop new saving products as well as rely on the same technique as other banks, increasing commission payments. On the other hand, Swedbank relied on tightening their amortization guidelines, in order to avoid excessive dept rather than increasing fees (Swedbank Annual Report 2015, 2016).

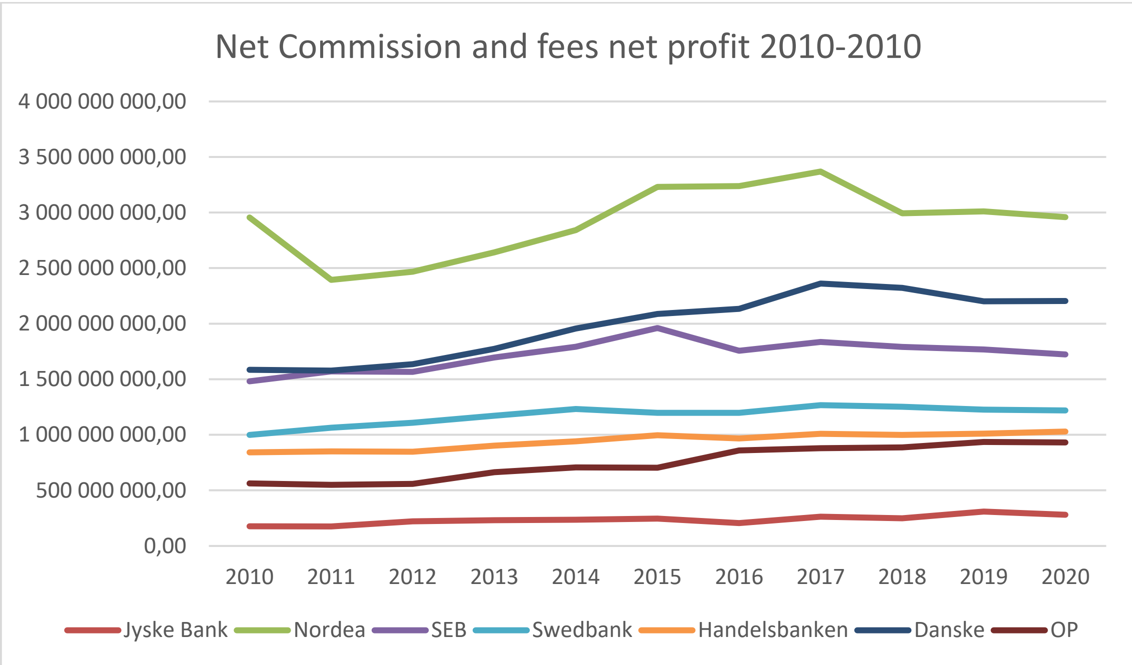

Figure 7. Net commission and fee income by group from 2010 to 2020. (Sourced from financial statements of mentioned banks)

Handelsbanken offset the decrease of interest income by rising commission fees from asset management and lending operations, when lending volumes were increasing due to the low interests (Annual Report 2014, 2015). Nonetheless, the implementation of these higher fees is yet to make a meaningful impact to profit.

OP battelled the effect of NIRP by improving their non-financial products, as they made 16% more profit off Life Insurance and 27,6% off Wealth Management in 2015 than in 2014 (Report by the Executive Board and Financial Statements 2015, 2016). The slight increase seen in *Figure 6.* for OP is due to those factors, the rising popularity of investing during NIRP, lead to demand of asset managers and increased reporting need which led to higher income for Wealth Management.

Overall, an increase of 20,25% is seen in the commission and fees profit, however other factors not just low interest rate affects the change. Due to lower demand of customer service and digitalization, banks were also forced to bring new product to customer e.g., apps, investing tools etc. This is also mentioned by interviewee X, as X mentions that new product development, especially IT product has become a substantial factor in succeeding as a bank nowadays.

Question C: Has the most important source of income changed due to NIRP?

Even though NIRP has affected banks' products, operating ways and on some level even profitability of some business areas the most important income source remained unchanged. When comparing Net interest income, Net commission and fees, and other income to Pre-tax profit, it becomes apparent that even though the *ratio* of Net interest income to Pe-tax profit dropped from before NIRP (2010) around 47 percentage points on average in 2020, the biggest income source of banks remains to be interest income. However, that noted, the ratio of Net commissions and fees increased on average around 5 percentage points meaning there have been changes in the way banks operate during low interest rates.

5 DISCUSSION AND CONCLUSION

As the result above suggest, NIRP has not made a substantial impact on profitability of the bank, however it has forced changes upon banks' operating ways and made some dents in pre-tax profit. Banks such as Jyske Bank, OP, Handelsbanken, and Swedbank made little fluctuation during NIRP, thus the pre-tax profit of banks stayed relatively stable. Nordea and SEB were both more fragile to NIRP as their profit decreased a year after the introduction of it in their operating areas. Profit of both banks decreased about 600 million EUR. Even though the profit of the banks did not endure major decreases, the one most important income source of banks did.

Annual Reports for 2015 of OP and Nordea mention that not only did the negative interests in Denmark, Sweden and Eurozone worsen the NII, thus the ratio of NII to profit too, but also that the cause behind lower NII is narrower credit spread of bonds, increased deposit volumes (retail banks), and local currency risks. Interviewee X seconds that by stating, that the economical state of banks was under stress in 2015 not only because of NIRP, but also from lending behavior changes. Nordea Annual Report for 2015 mentions that lending to household customers increased but remained unchanged for corporate customers, which effected NII (OP Financial Group Report by the Executive Board and Financial Statements 2015, 2016 ; Annual Report 2015, 2016).

Yet, Dankse Bank managed to increase their pre-tax profit and thus profitability during introductory years of NIRP. As mentioned in the chapter above, Danske Bank managed this by decreasing expenses, increasing fees, and lowering impairments. However, there lays ambiguity whether Danke Bank's Estonia money laundering case has an impact on these factors. According to Reuters' Teis Jensen about 200 billion EUR was laundered through Danske Bank between 2007 and 2015 (Jensen, 2018). On the other side, the aftermath of the money laundering case is clearly visible in the profit of the group. After 2017, when the case was first started to be investigated pre-tax profit dropped 25,12% and keeps decreasing due to high compliance costs. Furthermore, Danske's Report on the Non-Resident Portfolio at Danske Bank's Estonian branch (2018) states that the aftermath of the case led to closing of Latvian, Lithuanian, Russian and Estonian branches, which all lead to decrease of profit.

Expenses of banks have not been an important factor of banks staying profitable, as the results show no major fluctuation in either, personnel costs, or other operating expenses. However, personnel costs not fluctuating can be a sign of reduced staff, as inflation, no matter how low, increases wages and other costs related to personnel. When the expense stays relatively stable over a prolonged period, this conclusion can be made. Another aspect lobbying this conclusion is the decreased need of personnel and physical client service. This fact is also mentioned by both, Interviewee X and Y, where both conclude that the need is decreasing due to development of internet banking and new services.

According to annual reviews read during research, NIRP introduction forced banks to increase competitiveness by changing operating ways, introducing new services and IT programs, which may have not happened if low inflation was not battelled with the negative interests. This change may also have contributed to lower personnel count, as apps replace customer service personnel in banks. Gathered data shows that Net commissions and fees have risen slightly (*see Figure 6.)* during NIRP. Interviewee Y comments that one of the most important tools to battle NIRP has truly become the increase of fees. Demiralp et al. (2017) come to the same conclusion, that the fees have been an important factor of bank battling NIRP.

Nonetheless this research raises another finding; the main threat to banks' profit and profitability is not interest rate, but inflation, as inflation is the one factor that guides and directs the monetary policies and the way of the economy. This is also in alignment with the fact that NIRP was originally introduced to battle low inflation, which slows the economy, meaning NIRP is a tool to battle the real threat, in this case low inflation.

However, interest rate and inflation are factors that are closely knitted together as Central Banks can by fluctuating policy interest rates depreciate currency, curb, or accelerate inflation and boost economic activity (Policy Interest Rate (%), 2019), meaning examination of both, the tool (NIRP) and the cause (low inflation) is as equally important in order to understand the economic state of banks in the period of 2010 to 2020. Nonetheless, concern rising here is whether the decrease of interest rates is a functioning tool for maintain inflation at the wanted rate of 2%, as according to Jobst and Lin (2016) the goal of ECB's decision to reduce deposit rate was to restore inflation back to the ECB's price stability target, which *did not* happen, at least in a shortish period of negative interests (*see Figure 2*).

Results of the research also show that excess liquidity (cash) which banks pay for as a consequence of NIRP has become unwanted by banks due to its high costs. This empowered banks to mitigate excess liquidity by extending more loans. This is seen in the decrease of leverage ratio (debt-equity ratio) as it drops on average from 2010 to 2020 around 2-percentage points, however these calculations are made with values gathered from Groups' balance sheet, which may affect the result, nonetheless the trend is visible.

Mixed research method proved to be beneficial to the course of research, as it allowed to find reasoning behind data, as well as provide with additional information on some discrepancies of the data. However, simple sample selection made possible the inclusion of banks such as Danske Bank, which in some manner can be counted as incompatible for this research because of the Estonia case which affected the group's financial reporting.

Overall, the effect of negative interest rate has not had a tremendous effect on the income of banks as seen in data presented above, therefor this research concludes that banks have not suffered large losses after the introduction of negative interest rates, since negative interest motivated banks to develop new products, services and focus more on gains from non-interest income. Both, theoretical and empirical examining of the data and annual reports of banks included in this research clearly refer to slight increase of non-interest income as well as stabilization and normalization of excess liquidity. However, monetary policies such as ECB's Asset Purchase program and Targeted longer-term refinancing operations may have influenced, both excess liquidity and profit figures. Thus, a conclusion can be made that NIRP is not the only aspect effecting the ratio of NII and Pre-tax profit and profitability overall, but also various other facts including these monetary policies.

5.1 Reliability

During the research a few concerns and limitations that might affect the results arose, main one being Changes in IRFS standards and new bookkeeping legislations. These led to data being handled in different way, as these changes may affect eligibility to be compared. This was mitigated by using the newest possible data, e.g., if annual reports had 5-year overviews and the data was converted to correspond the same legislations and standards. Another factor worth mentioning is merges and acquisitions of groups, as these falsify the results where only the effect of NIRP is wanted to be researched. Nonetheless, these concerns are taken in consideration and mitigated to the extent that is possible. Lastly, other policies being in place at the same time with negative interest policy make it difficult to conduct, whether NIRP has been an effective tool.

5.2 Future research

Themes for future research based on the material read and the result of this study can be whether the fluctuating of interest rate and other monetary policies introduced by ECB been affective in keeping the inflation at moderate level. This could be carried out by comparing these monetary policies and how economy has reacted to each introduction, has some policy had more affect than other, and whether the change in economy been slow or fast.

Future research could also include a study on what tool of monetary policy is best to manipulate inflation rate, in which for instance the inflation rate is compared to each introduction year of monetary policy.

Finally, an interesting topic to be researched is whether the zero lower bound, which was believed to be impossible made investing more appealing. However, as investing is becoming more popular due to better understanding and knowledge, this research would need to be carried out with strict limitations as to what variables are considered to affect the results.

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