



UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Economics

The Swedish Mortgage Margin

Do the commercial banks hinder the Riksbank from reaching their full intended effects?

Rickard Holmgren and Karl Bronell

Supervisor: Conny Wollbrant
Master Degree Project No. 2016:90
Graduate School



UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

MASTER THESIS, SPRING 2016
Department of Economics
School of Business, Economics & Law
University of Gothenburg

The Swedish Mortgage Margin

Do the commercial banks hinder the Riksbank from reaching
their full intended effects?

Rickard Holmgren and Karl Bronell
8/31/2016

Abstract This paper examines whether the short term mortgage rate set by the commercial banks changes at the same pace as the nominal interest rate. This is done by empirically analyzing data from the four largest commercial banks in Sweden between the years 1997 and 2015. It also includes other determinants that are of importance when examining the mortgage margin. For the tested time period, the reported findings show that the mortgage margin has increased as the nominal rate has been decreasing. This paper argues that the four largest commercial banks in Sweden have such a high market power, making it possible for them to use the changes in the nominal interest rate to both strengthen their capital structure, as well as, paying high dividends to their owners. This indicates a monopolistic structure. The nominal rate could therefore be hindered to reach its full intended effect.

Supervisor: Conny Wollbrant

1 Introduction

On the 10th of February 2016, the Swedish central bank, the Riksbank, announced that the nominal interest rate, already at an all-time low, was to be lowered again. From the 17th of February it was to be set at the level of -0.50%. The four major commercial banks SEB, Nordea (NDA), Swedbank (SWED) and Handelsbanken (SHB), were expected to follow and lower their short term mortgage rates. However, none of them did. In fact, even though the Riksbank gradually has changed the nominal interest rate from -0.25% to -0.50% since July 2015, only one of the banks, SHB, has altered their mortgage rate. However, SHB only decreased it temporarily before increasing it to a level higher than before the adjustment. This means that none of the mentioned banks has recently fully followed the adjustments of the nominal interest rate.

The main objective of the Riksbank is to keep the inflation stable around 2% (the Riksbank, 2011). The inflation is measured through a consumer price index (KPI) that is supposed to collect the changes in the aggregated price level in Sweden. By lowering the nominal interest rate, the Riksbank is supposed to stimulate the economy by creating incentives to consume more and save less. This in turn is supposed to raise the level of inflation. Ever since the financial crisis in 2008, the inflation has been under its targeted level in Sweden. This has made the Riksbank act by gradually lowering the nominal interest rate to the level where it is today.

At the end of 2015, when the nominal interest rate was -0.35% (the Riksbank, 2016), the listed short term mortgage rates at SEB, Swedbank, Nordea and Handelsbanken were between 1.97% and 2.02% (compricer.se, 2016). If a consumer had a loan of SEK 1,000,000 and changed from the highest rate to the lowest, he or she would only have saved SEK 41.66 per month. The question to be asked is why none of the banks lowered their rates to widen the gap between lowest and highest rate to attract more customers. This study will investigate how the four major commercial banks respond to changes in the nominal rate and what adjustments, if any, they make.

To understand the price setting that the commercial banks use, one must first understand how the Riksbank collaborates with them. According to the Riksbank (2014), it does not lend money to the public households by itself, but instead lends to the commercial banks, making them intermediaries. This makes the level of the nominal interest rate the basis for the short term mortgage rate. The nominal interest rate, also known as the repo rate, is set by the

Riksbank and determines what level of interest the commercial banks have to pay when borrowing money from the Riksbank. The difference between the nominal interest rate and the interest rates of all available loans and deposits is called the interest margin. In this paper the focus is specifically on the difference between the nominal interest rate and the mortgage rate. This is known as *the mortgage margin*. Seb.se (2016-1) explains that its primary purpose is to cover the banks risks and costs, as well as adding an extra premium. In a model by Finansinspektionen they estimate the cost in addition to the direct finance cost of mortgage loans to 0.63 percentage points (the FI, 2013). This make it seems like the premium added by the commercial banks substantially raises the cost of mortgages for the consumers.

The determinants behind this margin have been studied in numerous papers. Ho and Saunders (1981) showed that the interest margin should always exist and that it depends on the degree of managerial risk aversion, the size of the transactions made by the bank, the market structure for the banks and the variance of the interest rates. Angbazo (1997) focused on how the risk level of loans and higher interest-rate risk affect the interest margin. He showed that the margin reflects both the default and interest risk. Maudos and de Guevara (2004), on the other hand, focused on the factors that explain the margin within the European Union and included the bank's operational costs as an explanatory variable determine the margin. They concluded that the level of the interest margin was affected by competitive conditions, as well as, reductions of interest rate risk, credit risk and operational costs.

According to the Swedish Bankers' Association (2015), the four major commercial banks in Sweden control almost 80% of the mortgage market and are hence the main actors in this segment. Saunders and Schumacher (2000) as well as Demirgüç-Kunt and Huizinga (1999) showed that one can look at the level of mortgage margin to see the amount of competition that exist in the market between banks. The higher monopolistic power the banks had, the higher their interest margins were. This means if the margin is small, the competition is high and vice versa. When examining the Swedish case, Bergman (1989) argued that the Swedish banks have a level of market power that is too high. It has created an oligopolistic situation where the banks have had the opportunity to increase the mortgage margin. This could be one of the explanations to why the mortgage rate may not have followed the change in the nominal interest rate.

There are institutions that are tasked with regulating the market in order to maintain stability and efficiency within the financial sector. In Sweden, the government agency responsible for

regulations is Finansinspektionen (the FI, 2016). There are also important international guidelines affecting the market, most notably the Basel accords. They are a central component in the international financial market providing a standardized recommendation for regulations in the banking industry. The Basel accords are released by the Basil Committee on Banking supervision (BIS). This is an international organization that aims to enhance financial stability. According to Nilsson *et al.* (2014), the main implication of the Basel accords is to regulate the financial structure for the banks. Among other things, the Basel accord provides definitions of bank capital, risk weighting and a universal standard of ratios. By the start of the selected data range, 1997, Basel I was active. However, it was shown that the Basel I accord was not sufficient and additional accords have been released. By 2006 the final drafts of Basel II were agreed upon and Basel III drafts were released in 2011 (BIS, 2015). The development of the Basel accords has changed the conditions within the banking sector.

This paper focuses on the mortgages that have the shortest period possible. In Sweden the commercial banks usually do not use a floating mortgage rate, but instead fix it for three months. The Riksbank (2016) explains that mortgages with longer terms are less affected by the nominal interest rate. Instead, they are more influenced by the international interest rates as well as the premiums that are added to compensate for the uncertainty of the future nominal interest rate. The reason why the short term period mortgages is examined in this paper is because it is the rate that has the highest level of correlation with the nominal interest rate

Further, the high level of market power that the four major commercial banks in Sweden have will be discussed. We believe that their actions do not follow the pattern that a company in a highly competitive market should. We also want to see how they adapt to the changes in the nominal interest rate and if their actions may hinder the work of the Riksbank. Our data set ranges between the beginning of 1997 and the end of 2015. As far as we know, this is the first paper to investigate a market where a few major actors have a substantial control of the market and what effect this has on the mortgage margin by using recent data that has been affected by the important Basel regulations.

The main findings of this paper show that there are both bank-specific and macroeconomic-specific variables that have a significant effect when determining the mortgage margin. This is in line with the results from Dietrich (2015) and others. The nominal interest rate, the Libor rate, the size and capital structure of the bank, how efficient they work and market regulations

all significantly affects the level of the mortgage margin. However, the amount of dividend paid and the GDP growth had no statistically significance in doing so. One thing that makes our results differ from previous research is that the efficiency rate has a positive relationship, instead of a negative, which means that it has a different effect on the mortgage margin. This could indicate that the commercial banks do not use the improved efficiency to lower the prices on mortgages for the consumers, but rather use it for something else, like e.g. higher dividends to the owners or increasing their capital structure. These results makes us suspect that the high market power shared by the major commercial banks may hinder the full effects intended by the Riksbank, when they alter with the nominal interest rate.

The rest of the paper will continue as follows: Section 2 will present related literature about the determinants of the margin and the effects that a monopolistic situation, as well as, regulations have on the net mortgage interest margin. Section 3 explores the Swedish mortgage market and why it is interesting. Section 4 will present the variable selection process. Section 5 presents the data and the methodology that has been used. Section 6 reveals the results and presents the analysis that has been made. Finally, section 7 highlights the conclusions that complete this paper.

2 Related Literature

The study of bank's interest margins is not a new field. It can be traced back to the middle of 1940's when Samuelson (1945) showed how an increase in the nominal interest rate affected the banks. He showed that rapidly increasing the nominal interest rate from one to two percent hurt the banks and most of the public, since it would change the value of the already employed capital. In 1981, Ho and Saunders (1981) started the research field about the determinants of the interest margin. They focused on finding what variables determined the margin, using data from 100 major American banks from the time period of 1976 to 1979. They tested interest rates that were fixed for different time periods. The shortest was three months and the longest 5 years. As mentioned earlier, they found that the degree of managerial risk aversion, the transaction sizes the bank made, the structure of the bank market, as well as the variance of the interest rates all had significant effects on the interest margin. This does not seem especially strange since this is consistent with how other industries operations are affected by similar aspects. For instance, the managerial risk aversion in companies usually affects the operations within the company as well as their offered prices and profits or losses.

Following the research by Ho and Saunders, others have further studied the topic. Bossone *et al.* (2002) investigated the effects the margin had at the bank level or micro level. They found that a number of different bank-specific variables had a significant effect on the margin. Other studies, such as, Laeven and Majnoni (2005) and Claeyns and Vander Venet (2008) have also focused on the economic structure of the banks and discovered that the size had a significant effect. Larger banks can benefit from operations of scale and operating efficiency, which have a negative relation with the margin. This is not surprising since larger companies, in any industry, usually benefit from these circumstances. When benefiting from operation of scale, companies reduce their costs and can hence offer their products to a lower price. This, along with other bank-specific variables, of course has significant effects on the mortgage margin and will be further discussed in the variable selection section.

There are also papers that have studied the correlation between different macroeconomic aspects, like GDP or inflation, and the margin. Studies by Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) have found several factors that are significant in determining the level of the interest margin. Both studies showed the interest margin to be changing with economic cycles, shocks and monetary policies. They also highlight business cycles as a significant factor that affects the lending rates and the creditworthiness of the people. When the creditworthiness changes, it alters the commercial banks risk level and hence the interest margin. This has shown that there are both bank-specific and macroeconomic determinants affecting the interest margin.

Additional determinants of the interest margin were identified by Saunders and Schumacher (2000). They were one of the first to have an international approach and they used a wider data set. Their data, collected from 1988 to 1995, consisted of six European countries and the US, including information from 614 different banks. They included both bank-specific and macroeconomic variables in their specification. What was new in their study was the discovery of a tradeoff between the banks having a high capital to asset ratio and lowering the prices for their services to the consumers. This seems logical since increased income could be used to strengthen the capital to asset ratio. They also found that reducing the volatility of the interest rate could reduce the bank margins. A reduced volatility usually means a decreasing risk. Since one of the purposes of the mortgage margin is to cover the banks risks, it should hence be decreasing when the risk level is lowered.

Further, Saunders and Schumacher (2000) also discovered that if the banking system was more restricted or segmented by geographical proximity or activity, it seemed to have fewer commercial banks. Instead the existing banks had higher monopolistic power. Economic theory explains that barriers associated with geographical and cultural distance makes it more difficult for firms to gain market share, unless they can offer a better or less costly product for the consumer. Therefore, in an open market where the banks offer the same similar products, the competition should decrease the monopolistic power and give beneficial effects in a social welfare perspective. This supports the classical economic theory that the level of competition in the market has an effect on the prices and costs. Having a high degree of competition, where it is easy to switch banks to get a better deal, would force the banks to increase their efficiency. This should lower the mortgage margin. Gischer and Jüttner (2003) investigated this by checking if global competition would have any effect on the interest rate. Their paper distinguished competition to have a significant negative effect on the margin, thus proving the theory. This displays the importance of competition in the market for the consumers.

The area of competition affecting the margin was further studied by Hawtrey and Liang (2008). They tested the competition effects by using data from 1987 to 2001 from thirteen selected OECD countries in Europe and the US. They compared different banks from different markets to see whether the level of market power a specific bank possessed, affected the interest margin. What they learned, was if a specific bank had high market power, or close to having monopolistic power, it had a significant effect on the margin. This is consistent with what Barajas, Steiner and Salazar (1999), Saunders and Schumacher (2000), Afanasieff *et al.* (2002) and Maudos and Guevara (2004) all had found earlier. This means if an actor has monopolistic power, the margin will be higher than when compared to a situation with tougher competition. This is also in line with economic theory, which state that in a monopolistic situation the price for a specific product or service is higher than in perfect competition. It makes it possible for the monopolistic firm to have a higher margin on their products and increase their profits. In this bank-specific case, it could lead to a higher mortgage margin compared to if the margin would have been in the social optimal level.

Another factor identified through the years to significantly affect the margin is regulations. In a paper by Chortareas *et al.* (2012), they investigated the dynamics between bank regulatory and supervisory policies associated with Basel II, as well as, bank's cost efficiency and performance. Results show that an increase in official supervisory power or control requirements has a distinguishable negative impact on bank efficiency. This likely arises from

an increase in agency problems, great market power and minimizing operational efficiencies. Demirgüç-Kunt *et al.* (2004) also investigated how regulations affected banks. They examined the interest margin by using data from 1400 banks across 72 countries. Their results showed that an increase in regulations boost banks' interest margin. Together these two articles provide results displaying that regulations serve to increase the margin in order to compensate for the decreased efficiency. However, regulations could also have the opposite effect. One example would be if the FI decided on regulating the level of the mortgage margin. If it was to be set lower than the existing level used by the commercial banks, it would of course decrease compared to the prior level. Hence, it is important to analyze the specific regulation before being able to expect what outcome it will have on the mortgage margin.

There are both positive and negative aspects with having a high mortgage margin. When dealing with this dilemma, it is important to account for the level of efficiency in the financial system. In order to investigate the efficiency of the financial intermediation, margins are often used as a proxy. Demirgüç-Kunt and Huizinga (1999) examined this and found that small margins may be suggestive of a system with a low level of intermediation costs and regulatory. On the contrary, relative large margins may bring a higher degree of stability to a banking system. They can add to the profitability and capital structure of the banks. This will help isolating them from shocks. Therefore, it is hard to determine what level of the margin that would be the optimal one for the society. The optimal level will probably also not be consistent between different countries and time periods since the variables used for determining that level is shifting.

The different articles mentioned above all have different focuses. The data sets usually differ and the interest margin they investigate is calculated in different ways. Only a few of them have their main focus on the mortgage rate for private consumers. However, many of the effects seem to, and should, have similar outcomes for the mortgage margin, even if they originally were more focused on the commercial loan market or the interest savings market. Although there are a few papers that focused on the mortgage interest rate and have some focus on its margin. One of them is Titman *et al.* (2005). They show that mortgages with property types that tend to be riskier exhibit a higher mortgage margin. This is consistent with the previously examined theory that a higher risk level increases the margin. Their data focused on mortgages from the US and the mortgages originating between 1992 and 2002. However, their paper included mortgages for private households as well as companies. This

paper will continue the research from previous studies, but instead focus completely on the private mortgage market in Sweden and investigate the effects some of the determinants of the mortgage rate have there.

To conclude, previous studies have researched many different aspects of the interest margin and the determinants included in it. However, there are not many studies that have been made in the 21st century, using recent data or including the new extensive regulations that have come lately. The technological development and the openness of borders, especially in the EU, have affected the markets. There are only a few papers that focus on the real-estate mortgage market, the mortgage rate and its margin for private households. There is also a lack of research that investigates how specific banks with great market power have affected the mortgage margin. This paper will include new data trying to identify these changes. It will also differ from previous papers by examining a mortgage market where the four main actors, whom have similar market shares, together almost controls the whole market.

3 The Swedish banking market

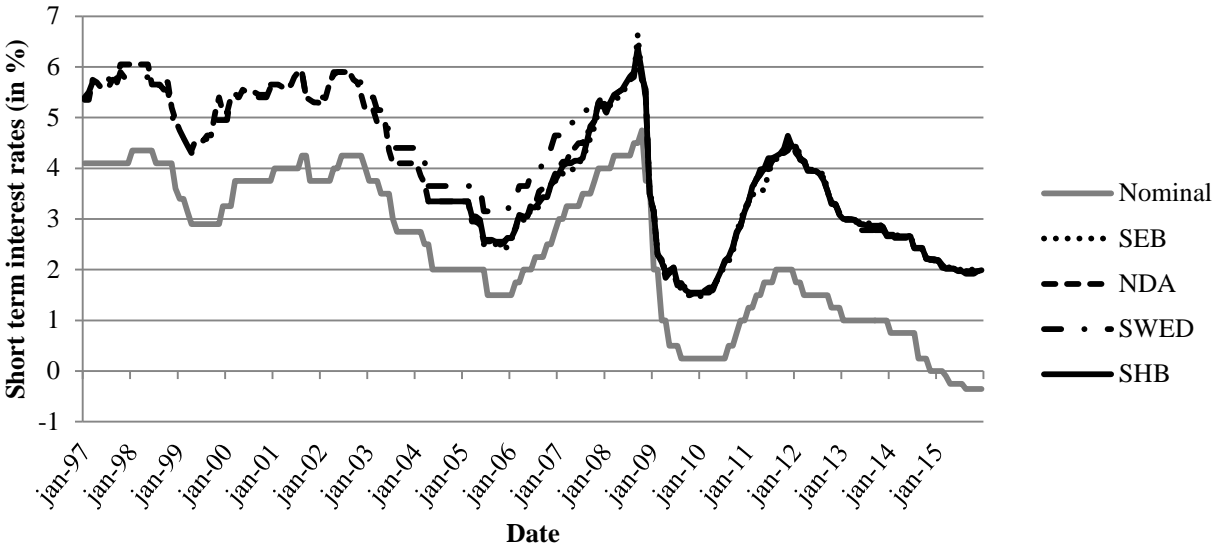
There are a lot of banks operating in the Swedish market. A reason for this is because Sweden is a member of the EU. This means there are no boundaries for moving capital or labor within the European region. It also facilitates for companies to form branches and gain market power in Sweden. According to the Swedish Bankers' Association (2015) by the end of 2014, there were 117 banks operating in Sweden, out of which 28 were foreign actors. The largest foreign bank in Sweden is Danskebank and they offer the same services and similar products as SHB, Swedbank, Nordea and SEB. Despite the foreign competition in Sweden, the market power shared by the four major commercial banks is still intact.

In Sweden, as well as in many other countries, the housing prices have increased rapidly lately. The level of the total mortgages has also increased. According to data published by the Swedish Statistical Central Bureau (SCB) in 2015, the total mortgage credit by the households was around 3.09 trillion SEK in the end of June 2014. The total mortgage credit has also been increasing (Swedish Bankers' Association 2015) and has risen with over 15% in the last three years. They concluded that it has been possible due to the all-time low nominal interest rate. According to Windstrand and Ölcer (2014), this has also caused the loan to value ratio to rise to around 200%. When a market is increasing so rapidly, it usually boosts the market leader's business and makes them more profitable. The increasing size of the mortgage market in

Sweden has been made possible by the low nominal interest rate, making it a major factor for the profitability of the banks.

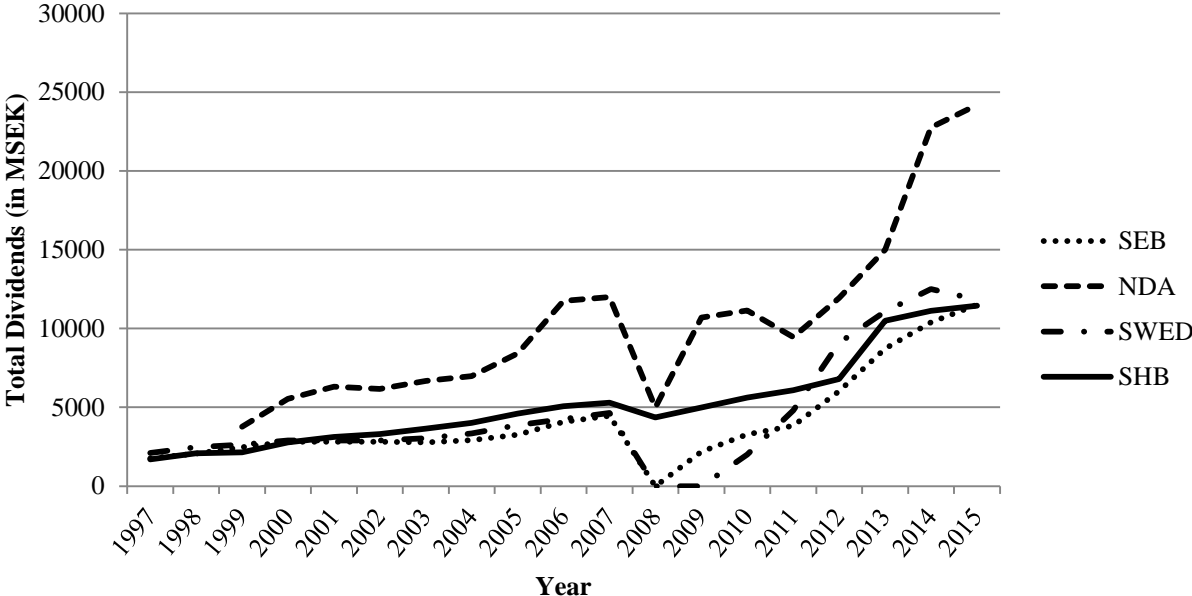
Mortgages is not the only service commercial banks offers and the banks can be divided in different groups depending on their supply of services. SHB, Swedbank, Nordea and SEB are all considered to be universal banks. They offer all types of financial services. There are also banks that only focus on a few financial services. They are known as niche banks. In this category, you find SBAB, ICA bank and Skandia bank among others. SBAB was founded by the Swedish government. Since 2011, they have become an independent bank niched towards mortgages in the Swedish market and the Swedish government is still a majority shareholder in SBAB. The bank does not offer the same variety of products as a universal bank like SEB does, but instead offers a lower list rate on mortgages (SBAB.se, 2016). Despite the fact that SBAB, and other niche banks, offers a lower list rate than the four major commercial banks, the latter still remain dominant in the market. There are many different aspects to why this is the case. First of all, when having a mortgage at one of the four major banks, the list rate is not the same as the actual interest rate. In fact, the actual rate can be negotiated and substantially decreased. This is not the case at SBAB, where the list rate cannot be negotiated. Another important factor is the loyalty of the customers and their unwillingness to switch bank, which will be discussed later. Together these two reasons make the Swedish mortgage market behave differently compared to a market with perfect competition.

Figure 1 Short term interest rates for the four major banks and the nominal interest rate from 1997 to 2015.



Today, the list rates for the short term mortgage rate of the four largest commercial banks are rather similar. As seen in figure 1, this is nothing new, but has been the case for years. They are especially alike since the end of 2008. Krugman and Wells (2013) explain that when the competition in the market is high, the price for the demanded product or service will fall to a level where it equals the costs for the company. This is classical supply and demand theory. It indicates that when the market matures, it will be difficult for companies to make profits since consumers will, as long as the quality of the product or service is the same, switch to the brand with the lowest price. That the levels of the rates are alike should indicate that the competition is tough and that it should be hard to make high profits for the banks.

Figure 2 Total Dividends paid by the four major banks between 1997 and 2015

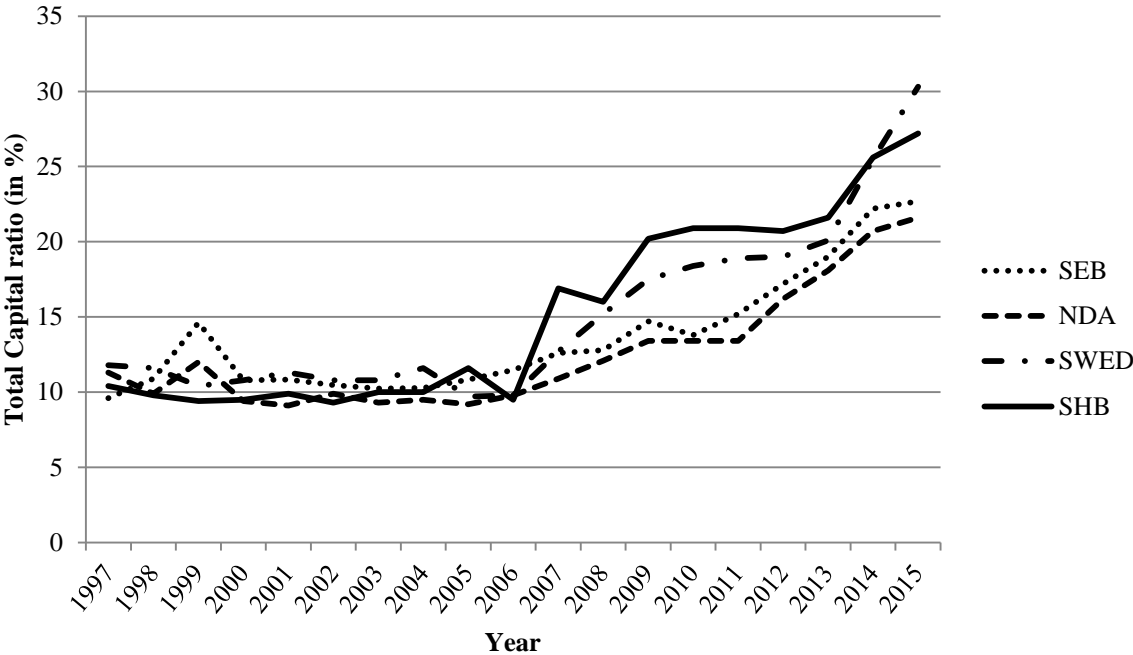


However, the four banks have made high profits lately and used that profit to pay out large dividends to their shareholders and increase their capital structure. As can be seen in figure 2, the total dividends of the banks have been increasing for most of the time between 1997 and 2015. It has been increasing even more rapidly since the end of 2008, when their interest rates converged. In figure 3, the capital adequacy ratio (CAR) is presented for the relevant banks. CAR is a measure of risk included in the Basel accords. In the Basel II accord, the risk weighting calculations were adjusted and in Basel III, the CAR measurement increased (BIS, 2013). The increases in CAR are likely originating from these frameworks. At the beginning of 2016, Basel III has not been fully implemented yet. However it has been presented, which has made it possible for the commercial banks to know the direction they need to be headed. As the CAR has been raised, dividends have also increased. Even though universal banks also

have other income sources than household mortgages, it still does not explain why no one of the mentioned banks attempts to gain a larger share of the mortgage market by lowering their rates. Instead they have all focused on paying dividends and increasing their capital structure.

A common explanation for companies to raise dividends is because their effectiveness has increased, leading to decreasing costs. Lower costs mean a higher profit margin and more money that can be returned to the investors. Increasing the capital structure of the firm is usually done by letting part of last year’s profit stay within the company as capital. To gain a higher profit, the company must lower its cost or increase their incomes. For an actor in the mortgage market, this could be done by increasing the mortgage margin as long as the customers stay. Since all of the four major banks in Sweden can increase both their total dividends, as well as, their capital structure, it is likely that the margin has been increased too much. There should be room for a specific bank to have a lower margin, increase its capital structure and keep the dividends at previous levels. This causes doubt in the increased effectiveness argument.

Figure 3 Total capital ratio for the four major banks between 1997 and 2015



The level of competition in the market is a crucial factor when it comes to how large profit a company can make. As Krugman and Wells (2013) explain, this should make it possible for either company to lower their price to gain a larger share of the market and increase their profits. Burda and Wyplosz (2013) on the other hand, shows that when there are fewer actors

who control a substantial share of the market, there are incentives for the producers to form collusions and agree upon the price level offered to the consumers in the market. This would make it possible for the involved parties to increase their profits. When examining figure 1, 2 and 3, it seems like none of them tries to gain a higher share of the market by differentiating in price, capital structure or dividends paid. This instead could indicate that there is collusion in the Swedish mortgage market.

There are many reasons to why people do not switch banks. Numerous Swedish news agencies (svt.se (2015), gp.se (2012), svd.se (2013) and DN.se (2012) amongst others) have reported that people do not typically switch banks even though they could get a better offer somewhere else. There are, according to them, many reasons for not doing so. They explain that most people are comfortable with their bank and do not want the extra work that it would take to change. There is also a belief among the people that switching is more difficult than it is. They further point out that the common opinion is that the gains are too small to bother finding where they could get the best offer, as well as the fact that nobody knows if the bank they may switch to will be cheaper in the future or if they just offer alluring prices to entice. Customers also value their special contact person they have at their bank, who knows them and their situation. These are some aspects that make it possible for the commercial banks to increase dividends and capital structure without losing too many clients.

There are many reasons to why the Swedish mortgage market is an interesting case. The four major universal banks have a very high market power. They are hardly affected by the international competition. A reason for this is because their customers are very loyal. This has made it possible for the actors in the mortgage market to use the low nominal interest rate to increase their dividends and their capital structure. None of them have tried to use the opportunity that exists to gain market shares, by lowering their prices to the consumers. This could indicate market collusion. The next section will present the data and method used to investigate this further.

4 Variable selection

In this section, both the dependent and independent variables chosen for this research is going to be presented. The underlying model used, is a modified version from Demirgüç-Kunt and Huizinga (1999), Demirgüç-Kunt *et al.* (2004) and Dietrich (2015). The regression technique

is based on macroeconomic-specific and bank-specific variables that are expected, or already been presented in earlier research, to have significant effects on the mortgage margin.

A factor that previous research has proven to be significant, when examining the mortgage margin is the bank-specific costs and aspects. The higher the costs, the higher the margin seems to be. Most companies aim to improve their effectiveness, meaning lowering their cost or increasing their assets. This should make it possible for a more effective bank to decrease the margin. There are also studies that have found negative relationships between the size of the bank and the margin (Ho and Saunders (1981) & Bossone *et al.* (2002)). They have found significant effects that larger commercial banks benefit from operations of scale, which could make it possible for them to have a lower margin than smaller banks. This is consistent with classical economic theory that larger companies can benefit of operations of scale. New aspects that will be consider in this paper, are also how the capital structure of the bank and its dividend polices will affect the margin.

It has also been proven that there are macroeconomic variables affecting the margin. Economic cycles and monetary policies are both seen as drivers behind how the interest rate changes. Dietrich (2015) explains that banks usually change their deposit rates faster than they change their mortgage rates. He also points out that the banks lacks incentives for a parallel adjustment since they profit from trying to have higher lending rates than deposit rates. This makes it possible for them to increase the margin on new loans and make their business more profitable.

There have also been studies showing that business cycles affect the interest rates and the margin. Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) found that the business cycle effects, proxied using GDP growth, could significantly affect the lending rates. This is due since it changes the creditworthiness of the customers. If the creditworthiness of the customers is being reduced, the risk of default increases and the margin should hence be increased. Further, Saunders and Schumacher (2000) concluded that macroeconomic factors are of importance when explaining the spread of the interest rates- and the margins. It is therefore of importance when examining the mortgage and interest market over time.

When examining a specific industry, there are also factors accounting for the structure of the market. Gischer and Juttner (2003) investigated the competitiveness of the banking market and confirmed the economic theory that companies in competitive markets have lower margins since they are more efficient. They did this by investigating how the global competition

affected the interest rates. They found that an increase in competition lowered the margin, which is as expected when comparing it to economic theory. However, Chortareas *et al.* (2012) examined how the banking market was affected when having a few actors with great market power. They used the Herfindahl-Hirschman index (HHI) of local market concentration and concluded that when a few banks have high market power, it increases the risk of market collusion. When colluding, the public benefit of increased efficiency due to competition disappears and the actors can agree upon the level of their margin. However, it is very difficult to prove that collusion exist when analyzing data and actions received from the banks. This is not especially strange since collusion is often discouraged or even illegal. This makes companies that are colluding to avoid the topic or claim that it is not the case.

4.1 Dependent variables

In this paper, the short term mortgage loan margin is used as the dependent variable. It is calculated as the difference between the listed three monthly mortgage interest rates, set by each commercial bank in the sample, and the nominal interest rate. The mortgage margin was chosen to be the dependent variable because this paper aims to investigate how it is affected by macro- and bank-specific variables over time. What differentiates this study from previous research, where the mortgage or interest margins also has been used, is that it focuses on the short-term mortgage rate in Sweden instead of an interest rate that are fixed for a longer period of time.

4.2 Independent variables: determinants of mortgage loan margins

Here, the independent variables of this paper will be presented and explained. First, the macroeconomic variables will be presented followed by the bank-specific variables. In table 1 all the variables have been shortly presented as well as their expected effect

4.2.1 Macroeconomic variables

There are of course numerous variables that could be investigated, when trying to find the determinants of bank mortgage margins. In this paper, three different macroeconomic variables have been chosen.

The first one is the nominal interest rate. It is the main independent variable of this paper since the intention is to examine whether the commercial banks alter their mortgage margin as the nominal interest rate changes. When examining figure 1, there seems to be a negative relation between the mortgage margin and the nominal interest rate. If so, than the mortgage margin increases as the nominal interest rate decreases and the nominal interest rate is

expected to have a negative effect on the margin. The analysis will also include lags to investigate whether there is a delay in the response from the commercial banks towards the changes made by the Riksbank and the expectations are that there should be a lag between them.

The second one to be used is the GDP growth rate of Sweden. It makes it possible for the regression to control for business cycle effects. Dietrich (2012) explains that the probability of default of a loan is strongly correlated with economic development and the country's economic situation. This in turn affects the mortgage margin since it affects the risk level of the bank and hence the list rate offered to the borrowers. When the economy is in recession the risk of default is higher and the risk premiums of mortgages increases, while the opposite happens when the economy is developing strongly. The GDP growth rate is thus expected to have a negative relationship with the mortgage margin.

The third one chosen to be investigated is the 3 month LIBOR rate. It is going to be used as a proxy for the money market rate. The Libor rate is often used as a standard in the financial market and is supposed to show the rate of interest at which banks can lend money between each other. Van den Heuvel (2002) explains that there is maturity mismatch between loans and deposits that reduces the commercial banks' profits. It comes since bank loans typically are long-term, while deposits are seen as short-term. This makes the banks lack incentives to adjust their deposit rates at the same pace and shifts in lending rates are typically larger than the shifts in the deposit rates, which increases the margin on new loans. This should also be the case for mortgages and a positive relation between the 3 month LIBOR and the mortgage margin is expected.

4.2.2 Bank specific variables

There are more factors than just the macroeconomic ones that affect the mortgage margin. In this section the five bank-specific variables, chosen in this paper to be analyzed, will be presented.

The first one is the natural logarithm of the book value of each bank's *Total Assets*. It was included since earlier studies have shown that a bank's size could significantly affect the mortgage margin. Larger banks benefit from operations of scale, which should make them more efficient and hence allow them to have a lower margin. However, a larger bank could also dominate the market if it has significant market power. If so, the margin would instead be higher than if the market share was smaller. In our case, the four major banks in Sweden have

high market power and it is expected that the mentioned variable should have a positive effect on the margin. This would also be consistent with the findings of Dietrich (2012).

The second bank specific variable included is the banks equity to total assets ratio. Demirgüç-Kunt *et al.* (2004) pointed out that banks with a higher equity to assets ratio have a lower risk of default. It means that they have less risk within the company and could therefore offer lower margins. If the bank has a higher ratio and still offers the same mortgage list rate as the other bank, it also means that the bank has a higher gross margin. However, there is also a cost for the banks to have a higher equity to total assets ratio and usually the customers will be the ones to pay for this. The expectation is then for the equity to total assets ratio to have a positive effect on the margin.

The third bank specific variable chosen is the cost to income efficiency rate. It is a variable measuring the quality of management, where good management translates into higher income and lower costs. Maudos & de Guevara (2004) explain that it is defined as “the operating costs necessary to generate one unit of gross income”. It means when the ratio increases, the managerial efficiency decreases. Therefore, a negative relation between the ratio and the mortgage margin is expected.

The fourth variable being examined is the Capital Adequacy Ratio (CAR). The extended Basel regulations have forced the Banks to increase this ratio. One way of increasing it is to raise capital or decrease the risk weighted assets. In order to raise capital without disrupting the profit, the banks can increase the mortgage margin. As can be seen in figure 3, all examined banks have increased their CAR during the examined period and it will be interesting to see whether the expected positive relation between the CAR and the mortgage margin is significant or not. This variable has not been examined in any earlier studies. It is included by reason of being a proxy for the increased regulations and improved Basel Accords.

The fifth variable included is a dividend payout ratio. It is calculated as the ratio between dividend per share and earnings per share. Of the mentioned banks, SEB has a stated goal to payout at least 40% of the earnings per share in dividends and the other banks have similar targets. This variable has not been included in previous research. It is introduced to investigate if a change in dividends to profit alters the mortgage margin. Since both the total dividends and the CAR have risen during the examined period, there is a possibility that the dividend policy have had a positive effect on the mortgage margin.

Table 1 Definition of Variables

Variable	Description	Expected Effect
Dependent variable		
Mortgage margin	Difference between the nominal interest rate and the mortgage rate.	
Independent variables		
<i>Macroeconomic-specific variables</i>		
Nominal interest rate	The repo rate set by the Riksbank (%).	+/-
GDP growth	Annual nominal GDP growth in Sweden (%).	-
Libor	Monthly rate of the 3-month Libor rate (%).	+
<i>Bank-specific variables</i>		
Total assets	Bank size, measured by the natural logarithm of the value of the bank's total assets. (ln)	+
Equity/Total assets	Equity over total assets (%).	+
Efficiency ratio	Measurement of quality of management, the operating cost necessary to generate one unit of gross income (%)	-
CAR	Measurement of a bank's capital, capital to risk weighted ratio (%).	+/-
Dividend payout ratio	Dividend per share over profits per share (%).	+

5 Data and Method

This section identifies the sources of data, presents the data and describes the model used to examine the data.

5.1 Data

In 1993, The Riksbank announced their official targets for annual KPI with implementation beginning in 1995. By 1997, the new targeting regime had been established. According to

Svensson (2014), this meant that the inflation target was credible and that the repo rate had reached a more normal level giving the Riksbank the opportunity to learn how to handle inflation. Therefore, the start of the tested time period in this thesis will range from 1997 until 2015.

For this paper, we have gathered data for the nominal interest rate, the three monthly mortgage rates from four commercial banks, macroeconomic variables and bank-specific variables. The nominal interest rate was collected from Statistics Sweden (SCB). The four banks which observations have been gathered from are: Swedbank (2016), Nordea (2016), Handelsbanken (2016) and SEB (2016-2). The mortgage rate from each bank has been retrieved from each respective homepage where their historical rates are published, except for Handelsbanken, where historical rates prior to 2004 were provided by mail from the bank after contact. The sample includes 228 time periods ranging monthly from 1997 until 2015, totaling 912 observations. The mortgage rates were available in 666 monthly observations and the panel was strongly balanced. The lack of observations depends on the three monthly mortgage rates not being available during the whole time period. We have dropped observations where volatile mortgage rate has been available instead of the three monthly mortgage rates. This was done to avoid the problem that these two mortgage rates can have different price settings. We have collected the latest available mortgage rate for each month and when no adjustment has been made, the mortgage rate from last month has been used. CAR, total assets, efficiency ratio, equity/total assets and dividend payout ratio were retrieved from the Bloomberg database while the GDP growth and the Libor rate were gathered from the OECD database.

The GDP growth was available in quarterly observations and the assumption that it was an average over the time period was made. Therefore the quarterly observations were assumed to be the same for each month within that quarter. The CAR, total assets, efficiency ratio and equity/total assets were only available on yearly basis and converted to monthly observations using cubic spline interpolation. Dividend payout ratio was also only available once a year. When converting it to monthly basis the variables were assumed to be the same throughout that year.

In table 2, we find descriptive statistics for the selected variables, including the mortgage rate and the mortgage margin for each separate bank. When exploring the different mortgage margins for the individual banks, we found that there exists a substantial difference between

the different means. This is likely explained by the fact that they have been operating the selected three monthly mortgage rates over different times, where the mortgage margin has been behaving differently. The minimum values for the mortgage margins are negative numbers. They only existed for one month in this sample and it was in December 2008, following the bank crisis (see figure 1), when the nominal interest rate dropped from 3.75% to 2%. The GDP growth has a mean of 2.53% with a minimum of -7.00% and a maximum of 8.20%. The Dividend payout ratio has a mean of 53.56% and a minimum of zero when no dividend has been distributed. One year it had a maximum value of 560.80% and it was the only occurrence of a year above 100%. It means that the bank paid out a dividend above five times its earning per share. One possible reason for a dividend above 100% is to defend the share price. It should also be noted that the lack in observations for several bank-specific variables may result in a lower observations in results compared to when applying only macroeconomic-specific variables.

Table 2 Descriptive statistics

Variables	N	Mean	Std.Dev.	Min	Max
Nominal Interest Rate (%)	912	2.401	1.466	-0.350	4.750
Mortgage Rate (%)	666	3.729	1.371	1.480	6.640
Mortgage Margin (%)	666	1.693	0.475	-0.320	2.700
Mortgage Margin SEB (%)	127	1.635	0.590	-0.160	2.680
Mortgage Margin NDA (%)	228	1.605	0.452	-0.250	2.600
Mortgage Margin SWED (%)	215	1.744	0.376	-0.320	2.700
Mortgage Margin SHB (%)	96	1.866	0.502	-0.250	2.680
GDP Growth (%)	912	2.533	2.786	-7.000	8.200
Libor (%)	912	2.690	2.292	0.223	6.862
Total Assets (ln)	876	14.39	0.588	13.13	15.67
Equity/Total Assets	876	4.349	0.595	2.985	6.050
Efficiency Ratio (%)	900	55.63	8.931	41.15	78.67
CAR (%)	900	13.80	4.671	8.827	30.30
Dividend payout ratio (%)	828	53.56	65.89	0.000	560.8

5.2 Methodology

This paper uses empirical evidence to study the effect of nominal interest rate on the mortgage margin. To do so we specified the following model:

$$\text{Mortgage Margin}_{i,t} = \beta_0 + \beta_1 * x_{i,t} + \beta_2 * z_{i,t} + \varepsilon_{i,t}$$

Where mortgage margin $_{i,t}$ is the mortgage rate subtracted by the nominal rate for each individual bank at time t . $x_{i,t}$ is a vector with macroeconomic-specific variables, including nominal rate with three lags, the Libor rate and the GDP growth. We chose to use three lags since the mortgage rate is fixed for three months. $z_{i,t}$ is a vector consisting of bank-specific variables counting the natural logarithm of the total assets, the equity/total assets, the efficiency ratio, the CAR and the dividend payout ratio.

In order to determine the model, further tests have been conducted. The data experiences panel-level heteroskedasticity, contemporaneously cross-sectional correlation and autocorrelation of type AR(1). To mitigate these problems and produce robust standard errors we followed Becks and Katz (1995) suggestion to rely on OLS coefficient estimates with panel corrected standard errors (PCSE). When running this regression, it follows that if the marginal rate does not change with the nominal rate, the coefficient for marginal rate should be equal to zero i.e. stay the same over time as the nominal rate changes. If, on the other hand, the marginal rate increases over time as the nominal rate changes, it should be negative and if the marginal rate decreases the outcome would be vice versa.

In order to convert yearly observations to monthly observations we choose to use cubic spline interpolation. This is a technique that provides estimates between known data points, thus avoiding creating unknown data. When performing regressions with data that has been interpolated, as in this case, it does introduce a systematic source of serial correlation hence violating the condition of no serial correlation. However, as mentioned above, the model used is accounting for autocorrelation problems.

Other factors that can affect the results are possible omitted variables. There are a lot of different variables chosen not to be included in this paper. One of them is the Herfindahl-Hirschman index. It has been excluded since the market share of the examined four banks has been relatively stable for a long period of time and there is a lack of data necessary to make the variable useful. The same goes for other variables like the Lerner index. Another variable

that has been examined before, but has been chosen not to be examined in this paper is geographical location. This was done since all of the examined banks operate all over Sweden and there are no geographical restrictions within the country for them. Previous research has found inflation, measured through KPI, to have a significant effect on the mortgage margin. This variable has also been secluded from this paper due to the high correlation with the nominal interest rate. Additional variables other than the already applied CAR would have been desired in order to control for the changes that might be experienced, due to the increased regulation enforced by the Basel accords and the changed environment. These limitations to the model could affect the results.

6 Results

Table 3 reports the regression. There are three different columns with results based upon (1) the macroeconomic-specific variables; (2) the bank-specific variables; (3) all variables. This provides the opportunity to evaluate the relative explanatory power of macroeconomic-specific variables and bank-specific variables separately¹.

Examining the coefficients in (1), the findings show the nominal rate to have a negative impact on the mortgage margin. The average change in the mortgage margin, after a change in the nominal interest rate over three months, has an inverse relationship from the nominal rate. This indicates that if the nominal rate has risen the mortgage margin has decreased, and if the nominal rate has decreased the mortgage margin has increased. In the first period, after a change in the nominal rate, the mortgage margin has a coefficient of -0.722. However, after the initial shock, the following time periods smoothens the gap. Therefore the total average change in the mortgage margin after three months adds up to approximately -0.227 percentage points. This indicates that the nominal rate has a negative effect on the mortgage margin and hence is different from zero when the nominal rate is adjusted. The nominal rate and the nominal rate_{*t-1*} are significant at the 1% level whilst the nominal rate_{*t-2*} shows no statistical significance and the nominal rate_{*t-3*} show statistical significance at the 5% level.

¹ The correlation of variables in the sample have been tested using VIF and a correlation matrix, no problems were detected. Results can be sent upon request.

Table 3 Regression results of the sample 1997-2015

Variables	(1) Macro-specific Variables	(2) Bank-specific Variables	(3) All Variables
Nominal Interest Rate	-0.722*** (0.0725)		-0.665*** (0.0745)
Nominal Interest Rate _{t-1}	0.653*** (0.0727)		0.719*** (0.0752)
Nominal Interest Rate _{t-2}	-0.000322 (0.0723)		0.0173 (0.0756)
Nominal Interest Rate _{t-3}	-0.158** (0.0706)		-0.156** (0.0739)
GDP Growth	0.0159 (0.0126)		0.0143 (0.0130)
Libor	0.0598* (0.0318)		0.0766** (0.0315)
Ln Total Assets		0.0793 (0.0580)	0.133** (0.0637)
Equity/Total Assets		0.253*** (0.0540)	0.229*** (0.0503)
Efficiency Ratio		0.0144** (0.00630)	0.0157*** (0.00547)
CAR		0.0526*** (0.0128)	0.0550*** (0.0146)
Dividend Payout Ratio		-0.000165 (0.000356)	-0.000353 (0.000284)
Constant	1.979*** (0.115)	-2.174** (1.075)	-2.977** (1.385)
Observations	666	606	606
R-squared	0.509	0.215	0.544
Number of bank	4	4	4

*, ** and *** indicate statistical significance at the 10 %, 5% and 1% levels

When examining the other control variables, we want to highlight that the Libor rate increases its significance when including all variables. When approaching the bank-specific variables, only one of them changes significance. It is the natural logarithm of the total assets which is statistically significant in the full model but not in the separate estimation.

When including additional variables in the full model (3), the effect from the nominal rates decreases compared to when only macro-specific variables are used. The total average effect from the nominal rate coefficients after three months is then -0.085 percentage points. The nominal rate experiences the same statistical significance level in both estimations, indicating no statistical significance in the second lag. The coefficient, Libor rate has a positive effect and significant relationship with the mortgage margin. A one percentage point increase in the Libor rate therefore increases the mortgage margin coefficient by 0.077 percentage point in Sweden according to this model, holding all other variables equal. This positive effect is a result consistent with Van den Heuvel (2002) and Dietrich (2015) and it is as expected. The GDP growth show no statistical significance and no conclusions will be drawn from its coefficient.

The total assets coefficient has a positive, statistical significant relationship with the mortgage margin. This coefficient is a measure of bank size where an increase in the natural logarithm of total assets by one percent, holding all else equal, increases the mortgage margin by 0.133 percentage points. Larger banks thus have higher mortgage margins than smaller banks. This result is confirmed by earlier studies such as Dietrich (2012). The Equity to total assets ratio variable is statistical significant at the 1% level. The coefficient of equity/total assets is 0.229, indicating that a one unit increase in this coefficient increases the mortgage margin by 0.229 percentage points and thus affects the mortgage margin positively. This shows that an increase in the equity/total assets, i.e. a decrease in risk of default, increases the mortgage margin. This is a relationship that is consistent with the results of Demirgüç-Kunt *et al.* (2004) and is as anticipated. The Efficiency ratio coefficient was expected to have a negative impact, however as table 3 shows both in separate and in full estimation, it shows a positive relationship with the mortgage margin. The Efficiency ratio show statistical significance at the 5% level in estimation (2) and at the 1% level in the full model. It implies that a decrease in managerial efficiency leads to an increase in the mortgage margin. This result is not in line with our expectations or previous studies such as Maudos & de Guevara (2004). In their study they analyze the interest margin in (Germany, France, the United Kingdom, Italy and Spain) during the years 1993-2003. The difference in the researched area and time interval might be

a factor as to why the results do not coincide. The CAR coefficient is statistical significant at the 1% level in both estimations. A one percentage point increase in the CAR coefficient increases the mortgage margin coefficient by 0.055 percentage points in this model. The effect from the CAR is positive thus indicating that a decrease in capital risk increases the mortgage margin. This relation meets our expectations. The Dividend payout ratio shows no statistical significance and we will refrain from drawing any economic significance from this variable. Considering these results, it implies that we can reject the hypothesis that the four investigated banks mortgage margins are constant in relation to the level of the nominal interest rate².

From figure 1, we can establish that the nominal rate has decreased during the sample. We can therefore, according to (3), draw the conclusion that the mortgage margin has increased over the tested time period. If there was a perfect market, the mortgage margin should not be increasing as our results show, but due to the high market power of SEB, NDA, SWED and SHB it could be a reason for the opposite. Above results, as well as the finding from Dietrich (2015), shows that larger banks have a higher mortgage margin. According to the economic theory, economies of scope, larger enterprises should experience lower costs and higher efficiency. This further strengthens the argument that the high market power of the big banks increases the mortgage margin due to their different pricing strategy and their desire not to be price leaders.

Further studies, where Chortareas *et al.* (2012) is one of them, consolidates further reasons as to why the mortgage margin might have increased during these results. They include variables which are not controlled for in our model. They presents findings that shows that an increase in regulations increased the inefficiency and as the profits (see figure 2) are increasing it is likely some of the loss is moved onto the consumers of services. This causes an increase in the mortgage margin, which is supported by our results.

² The sample was also divided in additional subsamples according to the release of the Basel accords. This was done in order to see if the changed framework had altered the results. This was an attempt to identify underlying driving factors, not detected by the variables in the model. The results were inconclusive and is therefore not presented here, they can however be sent upon request.

7 Conclusion

This paper examines whether the mortgage margin changes as the nominal interest rate changes, while using both other macroeconomic and bank-specific variables to control for the outcome. The commercial banks short term mortgage margin is determined by several factors. These include the bank's risks and costs, as well as, the nominal interest rate set by the Riksbank. The four commercial banks in this study control approximately 80% of the mortgage market in Sweden and hence are the main actors. This is the first paper focusing on a Swedish case and using current data. It examines whether the changes in the nominal interest rate fully achieves the intended effects or if the commercial banks instead use the changes in the nominal interest rate to strengthen their capital structure and increase their dividends. Furthermore, analyzing these aspects gives input to the discussion whether changing the nominal interest rate in Sweden is an effective instrument for the Riksbank.

The level of the mortgage margin the specific bank offer the customer is affected by the level of the market power the bank has. When the monopolistic effects and how they affect the margin have been examined earlier, by Saunders and Schumacher (2000) and Hawtrey and Liang (2008), their data was gathered from multiple different countries, with a focus on larger free markets within Europe and the US. Saunders and Schumacher (2000) dataset ends by 1995 while the Hawtrey and Liang (2008) sample continues until 2001. This indicates that both of these studies do not capture the effects from the recent updates of the Basel accords or the improved IT-communication and increased financial movement regulated by the EU. These aspects have amplified globalization and further changed the environment of the banking sector. The mentioned changes are observed within our data, which covers a time period from 1997 until 2015. Their studies analyzed if market power had an effect on the interest margin and its outcomes. We, on the other hand, have analyzed the consequences over time of a market with monopolistic behavior when multiple banks have a significant share of the market. The results gathered in this paper shows similar outcomes to those presented earlier, meaning that in a market where a few actors have substantial power, the mortgage margin will be higher. It would be interesting in future research to be able to include the Herfindahl-Hirschman Index (HHI) as a control variable. HHI is a measurement of the market concentration and can be used to investigate the effects of a monopoly structure market.

In the Swedish market there are actors that offer lower mortgage rates than what the four major commercial banks does. Even though it is fairly easy to switch banks, consumers show loyalty towards their banks even if they could save money by leaving for a competitor. This

creates opportunities for the commercial banks to act as if it is a monopolistic or oligopolistic market, thereby thwarting an effective supply and demand according to open market theories. It makes it possible for the commercial banks to use the changes in the nominal interest rate to strengthen their organizations by increasing their margin and dividends, instead of lowering the mortgage rates to the consumers. However, we have not been able to fully prove that collusion exists when analyzing the data and actions received from the banks. If collusion is indeed present there is a strong possibility that the changes in the nominal interest rate could be hindered from reaching its full intended effect.

Some of the determinants of the mortgage margin used as control variables in this paper strengthen earlier studies results. Determinants such as the natural logarithm of the total assets earlier applied in Dietrich (20015); equity/total assets found in Dietrich (2015) and Demirgüç-Kunt & Huizinga (1999); the Libor rate from Dietrich (2015) and Maudos & de Guevara (2004) all were statistically significant and exhibited similar effects on the mortgage margin. Dietrich (2015) focused on the Swiss banking sector during 2001-2011. Maudos & de Guevara (2004) extended their research to include more countries within the European market and Demirgüç-Kunt & Huizinga (1999) used 80 countries during 1988-1995. The dividend payout ratio chosen in this paper has not been observed in earlier studies, but showed no significance in our results. The capital requirements have been tested earlier by Chortareas *et al.* (2012) and they found that it influenced the mortgage margin positively. However, in this paper the CAR was used instead and was found to have a positive effect on the mortgage margin. From this it can be observed that this paper differentiates itself by focusing on a completely different area than earlier studies. In all of the above mentioned studies, the focus has been to test what is driving the mortgage margin. In this paper the focus has instead been on how the nominal interest rate affects the mortgage margin over time in a market showing signs of high market power.

Starting in the summer of 2015, all commercial banks in Sweden has been forced to present their average interest rate to consumers. The average interest rate is considerably lower than their list rate and would give a more accurate level of the mortgage interest margin. The actual mortgage interest rate that a consumer receives consists of two parts. First the list rate and secondly the discount rate each consumer has to negotiate with the bank. The forced publication of the average mortgage rate is designed to increase the competition in the market and raise awareness of the price level for mortgage services for the consumer. It would be

interesting to redo our study using this data instead, but since there are too few observations since the introduction this cannot be done properly at this time.

By examining the Swedish mortgage margin, our study contributes to the literature on how the monopolistic situation affects the mortgage margin when the nominal rate changes. This is an underdeveloped area especially for smaller transparent markets. Our findings suggest that the major Swedish banks may hinder the intended effect of changing the nominal interest rate by instead increasing the margin, as well as, their dividends. This causes the predictions made by the Riksbank to differ from the actual results since they lack control over the commercial banks responses. Further research could focus on elaborating the model by including more variables. It could also examine how the commercial banks responses to the changes in the nominal interest rate would differ if the market were to become more regulated. It would also be interesting to investigate whether the results would differ if a government restricted actor were to enter and gain more market power. An example of restriction could be to have a fixed level of the mortgage margin.

References

- Afanasiëff, T.S., Lhacer, P.M.V. & Nakane, M.I. 2002, "The determinants of bank interest spread in Brazil", *Money affairs*, vol. XV, no. 2, pp. 183-208.
- Angbazo, L. 1997, "Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking", *Journal of Banking and Finance*, vol. 21, no. 1, pp. 55-87.
- Bank for international settlements. 2015, "BIS chronology, 1929-2014". BIS.org [online] Available at: <http://www.bis.org/about/chronology.htm?m=1|4|550> [accessed 2016-02-24]
- Barajas, A., Steiner, R. & Salazar, N. 1999, "Interest Spreads in Banking in Colombia, 1974-96", *IMF Staff Papers*, vol. 46, no. 2, pp. 196-224.
- Basel Committee on Banking Supervision. 2013, "A brief history of the Basel Committee". Basel: Bank for international settlements [online] Available at: <http://www.bis.org/bcbs/history.pdf> [accessed 2016-02-24]
- Beck, N. & Katz, J.N. 1995, "What to do (and not to do) with Time-Series Cross-Section Data", *The American Political Science Review*, vol. 89, no. 3, pp. 634-647.
- Bergman, M. 1989, "Bankernas lönsamhet", *Ekonomisk debatt*, vol. 89, no. 3, pp. 241. Available at: <http://nationalekonomi.se/filer/pdf/17-3-mb.pdf> [accessed 2016-02-22]
- Bernanke, B. & Gertler, M. 1989, "Agency Costs, Net Worth, and Business Fluctuations", *The American Economic Review*, vol. 79, no. 1, pp. 14-31.

- Bossone, B., Honohan P & Long, M. 2002, "Policy for small financial systems.",
The Worldbank, Washington
- Burda, M.C. & Wyplosz, C. 2013, *Macroeconomics: a European text*, 6.th edn, Oxford
University Press, New York, NY
- Chortareas, G.E., Girardone, C. & Ventouri, A. 2012, "Bank supervision, regulation, and
efficiency: Evidence from the European Union", *Journal of Financial Stability*, vol. 8, no.
4, pp. 292-302
- Claeys, S. & Vander Vennet, R. 2008, "Determinants of bank interest margins in Central and
Eastern Europe: A comparison with the West", *Economic Systems*, vol. 32, no. 2, pp. 197-
216.
- Compricer. 2016, "Översikt bolåneräntor - snitträntor & listräntor". Compricer.se [online].
Available at:
[https://www.compricer.se/borantor/?averagerateyear=2015&averageratemonth=4#three_m
onths_to_two_years](https://www.compricer.se/borantor/?averagerateyear=2015&averageratemonth=4#three_months_to_two_years) [accessed 2016-03-31]
- DN. 2012, "Att byta bank behöver inte vara så krångligt", DN.se [online]. Available at:
<http://www.dn.se/arkiv/ekonomi/att-byta-bank-behoover-inte-vara-sa-krangligt> [accessed
2016-03-01]
- Demirgüç-Kunt, A. & Huizinga, H. 1999, "Determinants of Commercial Bank Interest
Margins and Profitability: Some International Evidence", The World Bank.
- Demirgüç-Kunt, A., Laeven, L. & Levine, R. 2004, "Regulations, Market Structure,
Institutions, and the Cost of Financial Intermediation", *Journal of Money, Credit and
Banking*, vol. 36, no. 3, pp. 593-622.
- Dietrich, A. 2012, "Explaining loan rate differentials between small and large companies:
evidence from Switzerland", *Small Business Economics*, vol. 38, no. 4, pp. 481-494.
- Dietrich, A. 2015, "What Drives the Gross Margins of Mortgage Loans? Evidence from
Switzerland", *Journal of Financial Services Research*, pp.1-22.
- The FI. 2013, "Bankernas räntor och utlåning", FI.se [online] Available at:
http://www.fi.se/upload/43_Utredningar/20_Rapporter/2013/bru_kv3_2013.pdf [accessed
2016-06-25]
- The FI. 2016, "Så styrs FI", FI.se [online] Available at:
<http://www.fi.se/Om-FI/Vart-uppdrag/Sa-styrs-FI/> [accessed 2016-03-01]
- Gischer, H. & Jüttner, D.J. 2003, "Global competition, fee income and interest rate margins of
banks", *Kredit und Kapital*, vol. 36, no. 3, pp. 368-394.

- GP. 2012, "Inte svårt byta bank", GP.se [online]. Available at:
<https://www.gp.se/ekonomi/minapengar/1.869020--inte-svart-byta-bank-> [accessed 2016-03-01]
- Handelsbanken. 2016, "Annonserade räntor för Stadshypotek 2008-2016", Handelsbanken.se [online]. Available at:
[https://www.handelsbanken.se/shb/inet/icentsv.nsf/vlookuppics/stadshypotek_webb_historiska_rantor_160205/\\$file/historiska_rantor_2008_2016_160205.pdf](https://www.handelsbanken.se/shb/inet/icentsv.nsf/vlookuppics/stadshypotek_webb_historiska_rantor_160205/$file/historiska_rantor_2008_2016_160205.pdf) [accessed 2016-02-16]
- Hawtrey, K. & Liang, H. 2008, "Bank interest margins in OECD countries", *North American Journal of Economics and Finance*, vol. 19, no. 3, pp. 249-260.
- Ho, T., Saunders, A., 1981. The determinants of banks interest margins: Theory and empirical evidence. *Journal of Financial and Quantitative Analysis XVI (4)*, 581–600.
- Kiyotaki, N. & Moore, J. 1997, "Credit Cycles", *Journal of Political Economy*, vol. 105, no. 2, pp. 211-248.
- Krugman, P.R. & Wells, R. 2013, *Macroeconomics*, 3.th edn, Worth, New York.
- Laeven, L. & Majnoni, G. 2005, "Does judicial efficiency lower the cost of credit?", *Journal of Banking and Finance*, vol. 29, no. 7, pp. 1791-1812.
- Maudos, J. & Fernández de Guevara, J. 2004, "Factors explaining the interest margin in the banking sectors of the European Union", *Journal of Banking and Finance*, vol. 28, no. 9, pp. 2259-2281.
- Nilsson, V., Nordström, J. & Bredmar, K. 2014, "The Need for Liquidity and the Capital Structure of Swedish Banks Following the Financial Crisis", *International Journal of Finance & Banking Studies*, vol. 3, no. 2, pp. 10-27.
- Nordea. 2016, "Historiska boräntor", Nordea.se [online]. Available at:
<http://www.nordea.se/privat/aktuella-priser-och-rantor.html> [accessed 2016-02-16]
- The Riksbank. 2011, "How is inflation measured?" Riksbank.se [online]. Available at:
<http://www.riksbank.se/en/Monetary-policy/Inflation/How-is-inflation-measured/> [accessed 2016-01-05]
- The Riksbank. 2014, "Riksbankens penningpolitiska styrsystem – en översyn" Riksbank.se [online]. Available at:
http://www.riksbank.se/Documents/Rapporter/Riksbanksstudie/2014/rap_riksbanksstudie_140326_sve.pdf [accessed 2016-01-05]
- The Riksbank. 2016, "Repo rate, table", Riksbank.se [online]. Available at:
<http://www.riksbank.se/sv/Rantor-och-valutakurser/Reporanta-tabell/2015/> [accessed 2016-02-16]

- Samuelson, P.A. 1945, "The Effect of Interest Rate Increases on the Banking System", *The American Economic Review*, vol. 35, no. 1, pp. 16-27.
- Saunders, A. & Schumacher, L. 2000, "The determinants of bank interest rate margins: an international study", *Journal of International Money and Finance*, vol. 19, no. 6, pp. 813-832
- SBAB. 2016, "Våra bolåneräntor", SBAB.se [online] Available at:
https://www.sbab.se/1/privat/vara_rantor.html [accessed 2016-04-21]
- SCB. 2015, "Monetary financial institutions' assets and liabilities", SCB.se [online]. Available at:
http://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__FM__FM5001__FM5001A/FM5001SDDSMFI/?rxid=48b7deac-fca1-41ca-a790-878852f42d25 [accessed 2016-03-01]
- SEB. 2016-1, "Ränteskola om bolån", SEB.se [online]. Available at:
<http://seb.se/privat/lana/bolan-och-rantor/ranteskola-om-bolan> [accessed 2016-02-16]
- SEB. 2016-2, "Historiska Boräntor", SEB.se [online]. Available at:
<http://seb.se/pow/apps/HistoriskaBorantor/boratt.aspx> [accessed 2016-02-16]
- SvD. 2013, "Så lätt byter du bank", SvD.se [online]. Available at:
<http://www.svd.se/sa-latt-byter-du-bank> [accessed 2016-03-01]
- Svensson, L.E.O. 2015, "The possible unemployment cost of average inflation below a credible target", *American Economic Journal: Macroeconomics*, 7(1): 258-96.
- SVT. 2015, "Experterna: Inte svårt att byta bank", svt.se [online]. Available at:
<http://www.svt.se/nyheter/inrikes/experterna-inte-svart-att-byta-bank> [accessed 2016-03-01]
- Swedbank. 2016, "Historiska räntor", Swedbank.se [online]. Available at:
<http://hypotek.swedbank.se/rantor/historiska-rantor/index.htm> [accessed 2016-02-16]
- Swedish Bankers' Association. 2015, "The Mortgage Market in Sweden", Swedishbankers.se [online]. Available at:
http://www.swedishbankers.se/Documents/1509_Bolånemarknaden_eng.pdf [accessed 2016-03-08]
- Titman, S., Tompaidis, S. & Tsyplakov, S. 2005, "Determinants of Credit Spreads in Commercial Mortgages", *Real Estate Economics*, vol. 33, no. 4, pp. 711-738.
- Van den Heuvel, Skander J 2002, "Does bank capital matter for monetary transmission?", *Federal Reserve Bank of New York Economic Policy Review*, vol. 8, no. 1, pp. 259.

Windstrand, J., & Ölcer, D. 2014, "How indebted are Swedish households?", Riksbank.se [online]. Available at:
http://www.riksbank.se/Documents/Rapporter/Ekonomiska_kommentarer/2014/rap_ekonom_nr01_140507_eng.pdf [accessed 2016-03-08]