Swedish Household Debt and the Effect of the European Union

-An Econometric Time Series Analysis on Debt Ratio in Sweden

Kjell Magnus, Myrbäck Albin

Abstract:

This paper examines the development of the debt ratio of Swedish households from 1987-2020 as well as its driving forces. By using econometric time series analysis variables that are suspected to impact the debt ratio are tested, including a dummy variable for the time since Sweden became a member of the European Union. Theories of leverage, supply and demand in the mortgage market and the case for free trade are used to provide depth to the thesis.

Statistically significant results are found for the variables mortgage bonds, inflation, and EU-membership. While inflation exhibits a negative effect on the debt ratio, mortgage bonds and the dummy variable for EU-membership displays a positive relationship on the debt ratio.

Keywords: Household debt, European Union, Sweden, Co-Integration, Time series analysis

Bachelor's thesis in Economics, 15 credits
Spring Semester 2022
Supervisor: Yuejun Zhao

Department of Economics
School of Business, Economics and Law
University of Gothenburg

Table of contents

1 Introduction

The last 30 years in Sweden have been characterized by a significant increase in housing prices. Since 1987 the prices for small houses have seen a six-fold increase, simultaneously, the indebtedness of Swedish households has shown a resembling growth (Riksbanken, 2017). According to the Swedish central bank, Riksbanken, the enlarged debt constitutes a risk for the financial and macroeconomic stability in Sweden (Riksbanken, 2017).

This thesis strives to investigate what variables have contributed to this change in debt ratio and further, it examines if Sweden's membership to the European Union (EU) had any effect on the debt ratio of the Swedish households. The research questions that will guide the work in this thesis are which macroeconomic factors have affected the debt of Swedish households in the short run compared to the long run, as well as if the Swedish entry to the European Union has affected the debt of Swedish households.

The purpose of this thesis is to collect and bring forward evidence that can explain the current situation of Swedish household debt. An econometric time series analysis is conducted to provide explanations to these questions. Variables inspired by previous studies included in the regressions, are: Policy rate in Sweden, housing prices, financial assets, mortgage bonds, inflation and: A dummy variable that is used to indicate the years of Swedish membership in the European Union. Due to data collection and limitation issues, this thesis focuses on the Swedish example during 1987 and 2020. To understand and explain the questions at hand with more depth, theories of leverage, supply, and demand (on the mortgage market) and free trade are used.

Finally, this thesis finds statistically significant results for the variables mortgage bonds, inflation, and EU-membership. Thus, they have affected the debt ratio among Swedish households. Mortgage bonds are shown to have a positive effect on the debt ratio while inflation exhibits a negative effect. The dummy variable for EU-membership displays a positive relationship on the debt ratio which indicates that the membership to the union and the access to the single market in fact correlated with the increased debt ratio.

1.1 Background

Since the mid-90s the debt ratio of Swedish households has increased substantially (Statistiska centralbyrån, 2022). The measurement which is called debt ratio consists of a household's total debt divided by the disposable income. An increase in the ratio therefore implies that the nominal debt of the household has increased more than income. This chapter will present the reader with an historical overview including important events as well as discuss consequences of the increasing debt ratio. Finally, other papers that have contributed with inspiration to this thesis will be discussed.

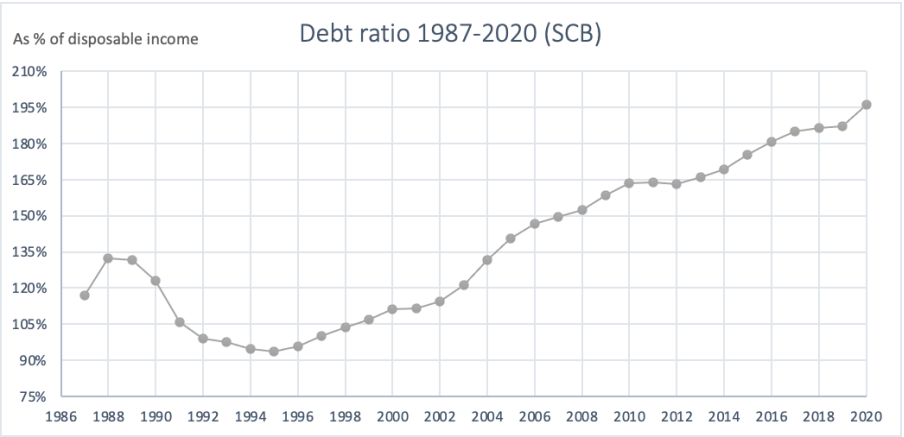

Figure 1- Debt ratio in Sweden from 1987-2020 (SCB).

1.1.1 Historical context

After the second world war Sweden experienced a long period of economic growth and financial stability (Englund, 2018, 54-55). During this time, banks in Sweden were subject to state-regulation and had to follow credit-restrictions regarding lending, interest rates and were obliged to invest a particular share of their investments in housing and state-obligations. In the early 80s, the system became increasingly unpopular because of its inefficiency and was considered outdated (Englund, 2018, 54-55). Therefore, a review of the Swedish banking system had to be made. The following ten years would be eventful in Swedish economic history as the government gradually gave up their control of the financial market (Englund, 2018, 54-55). That marked the start of a new era for the banks since they now could compete for market shares and sell loans on a free market. Complemented by expansive fiscal policies, disposable income and inflation grew fast and resulted in a credit boom. From 1985 to 1990 the lending from banks increased in nominal terms 16% annually and 9% in real terms (Englund, 2018, 55).

As a result, money flowed into the real estate market where prices for small houses increased 30% over the same time. The expansion of credit pushed down the unemployment to 1.7% and caused a boom in the economy with high inflation. Therefore, the central bank decided to raise the policy rate which put households and housing prices under pressure. When it later spread to companies within the financial sector as credit losses, belief in the Swedish banks were seriously questioned and in 1992, many of the big Swedish banks fought for their survival (Englund, 2018, 55-56).

Simultaneously, investors were speculating against the Swedish krona and its fixed currency rate. In September 1992 the Swedish central bank had to raise interest rates to 500% as a defense mechanism. To prevent panic, the Swedish government acted and introduced a guarantee for deposits for depositors and financiers. A bank named Gota bank faced severe problems and were taken over by the state without compensation to the owners. Nordbanken, was a state-owned bank, was capitalized and eventually merged with Gota bank to form the foundation of today's Nordea (Englund, 2018, 56-57). Another step in handling the crisis was taken in November 1992 when the Swedish krona was set free from its fixed rate, allowing the krona to depreciate approximately 20%. The free-floating currency provided a healthy injection for Swedish export and when the newly instated inflation target of 2% gained credibility, the policy rate converged with the global rates (Englund, 2018, 57).

After a referendum in 1994, where the Swedes voted yes, Sweden joined the European Union on the 1st of January in 1995. By doing so, Sweden could be a part of the common market with free movement of goods, services, human and capital (SIEPS, 2021). The union has since then come to play a significant role in the Swedish economy. It is providing access to a free-trade area with 450 million inhabitants. Since a free-trade area facilitates export, Sweden as an exporting country could take advantage and benefit from the entrance to the EU. In 2020, 52% of Sweden's total export went to other EU countries, the corresponding number on import was 68% (Europeiska kommissionen, 2022). Since Sweden entered the EU, the debt ratio and housing prices have increased even further as shown in figure. According to the Swedish financial inspection, the increasing housing prices is a vital factor in the increase of the debt ratio (Finansinspektionen, 2021).

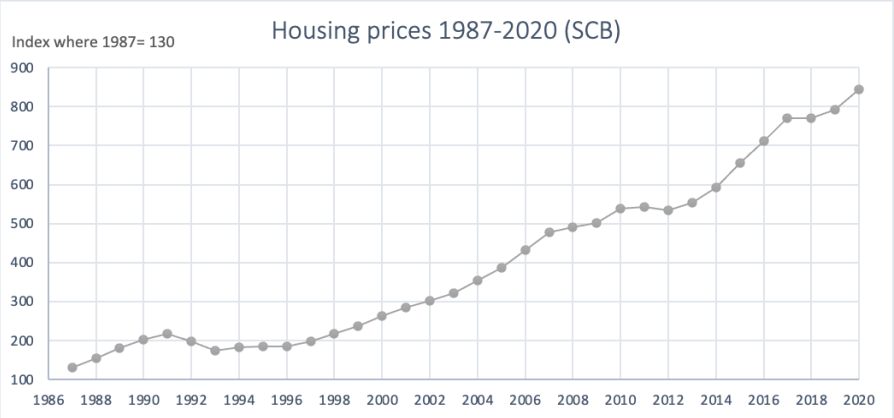

Figure 2- Indexed prices on houses in Sweden from 1987-2020 (SCB).

The new and lower interest rate-climate that has influenced the world since the financial crisis in 2008 has decreased the costs of borrowing which is needed for buying housing and therefore has increased the demand for housing. To combat the rising debt and lower the risks for the financial and macroeconomic system, the Swedish government through Finansinspektionen (FI), introduced restrictions on lending. These actions consist of a lending roof as well as a requirement for amortization (Finansinspektionen, 2021).

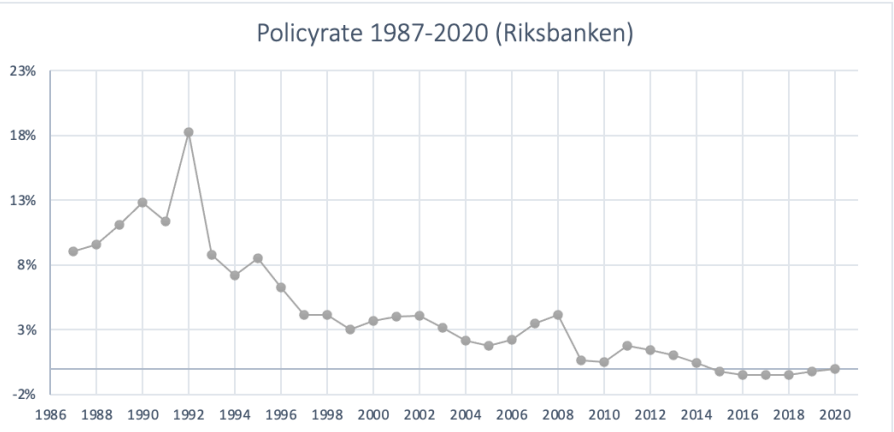

Figure 3- The policy rate in Sweden, set by Riksbanken, from 1987-2020 (Riksbanken).

1.1.2 Consequences and risks connected to the higher debt ratio

High debt is connected to high risk for individual households, national financial stability, and general macroeconomic development. Households with high debt are more sensitive to higher interest rates and are therefore more prone to consume less in times of recessions (Finansinspektionen, 2021). In that way an economic conjunction can spread to the broader economy. Since interest rates have been low for many years, there is a risk that consumers do not account for higher interest rates in the future, which could implicate that households take on more debt than they can handle (Riksbanken, 2017). If interest rates were to increase in the future, prices will, according to the logic of supply and demand fall, potentially leaving households with debt that they cannot pay off which can cause a financial crisis.

1.1.3 Literature review

The subject of Swedish indebtedness and the possible factors that might affect it have been widely discussed in academic texts as well as in general media. The focus has often been on housing prices and debt but also on macroeconomic consequences in general.

In order to introduce ourselves to the subject current empirics and publications within the field were researched to equip us with the basic understanding of the subject and its characteristics. Two publications have especially been of inspiration for this thesis. More precisely, Sanja Panić the author of *"Household debt in Sweden - an empirical investigation of the determinants of the debt increase from 1980 - 2009",* released in 2010. As well as "*Den Svenska bostadsmarknaden och dess koppling till skuldkvoten"* by Melinda Ottosson and Joanna Bill from 2016.

The main use of these publications was to provide information about the subject but also to understand which variables that might affect the Swedish indebtedness according to previous studies. It guided the choice of variables and gave inspiration to the main structure of this thesis. By studying these publications along with other published literature within the field a knowledge gap was identified regarding Sweden's membership into the European Union and its effect on Swedish indebtedness. Inspired by the lack of research on the matter, this thesis will focus on addressing the question marks related to the EU- membership.

1.2 Purpose and research question

The aim of the study is to examine which and to what extent chosen macroeconomic variables affect the debt ratio for Swedish households. To answer the defined questions econometric time series analysis will be used, complemented by theories of leverage, supply and demand as well as the case for free trade. The aim is to understand and motivate which factors that affect the debt ratio of Swedish households. The time period examined ranges from 1987 to 2020 where 1995 and forward are especially of focus since that was when Sweden joined the European Union. The research questions of focus are the following:

- *Which macroeconomic factors have affected the debt ratio of Swedish households in the short run compared to the long run?*

- *Did the Swedish entry to the European Union affect the debt ratio of Swedish households?*

1.3 Theoretic framework

This thesis will focus and elaborate around the theories of leverage, supply and demand in the mortgage market and free trade. The effect of leverage is thought to affect the household debt due to the positive effects that leverage yields. Supply and demand within the mortgage market is expected to explain the mechanisms of what influences change in debt. Lastly, the theory of free trade is expected to give an interpretation of the incentives and economic effects of joining the EU. These theories will guide this thesis and make up the foundation of an analysis of the econometric results.

1.3.1 Leverage

The effect of leverage is a concept used in many fields within economics. Commonly used in trading and finance as to increase the exposure of the initial investment and therefore also increase the possible gains (IG, 2022). The effect of leverage is however also used by households as a form of multiplication tool. The formula for leverage is stated as assets divided by equity equal to 1 divided by the solidity (Fregert & Jonung, 2018, 82).

$$\frac{assets}{equity} = \frac{1}{solidity} \quad \textit{(Equation 1.)}$$

The effect of leverage is therefore measuring the ratio between total assets and the equity of the household. A common practice by households is to use leverage when buying a residence. By obtaining debt the household enables a higher purchasing power when investing in housing. Leverage further enables a multiplication effect where an increase in housing prices will increase the return in relation to its equity. This implies that households will profit when the market is booming but will in contrast suffer in a recession. As can be seen by equation 1, a low solidity implies a higher risk as much of the assets are funded by debt as in contrast funded by equity (Fregert & Jonung, 2018, 81).

This theory can be put to practice by providing an example. Assuming that a household wants to buy real estate at a value of 4 000 tkr. Further assuming that the household has saved up 600 tkr of equity which implies that a mortgage of 3 400 tkr has to be applied for. This realizes a solidity of 15% by equation 1.

In this example the household owns total assets approximately 6.6 times their equity. The leverage is enabling high gains if assets increase in value but constitute a high risk if the assets decrease in value. The example will be continued to illustrate this risk. If the assets increase by 10% the increase in equity will be equivalent to 400 tkr, which increases total equity for the household to 1 000 tkr (600 tkr + 400 tkr).

$$Assets \times \ price\ increase\ \% \ = \ increase\ in\ equity$$ *(Equation 2.)*

The percentage increase in equity is however significantly larger than the initial 10% price increase since only 15% of the assets are funded by equity. To calculate the percentage increase in equity the leverage of 6.6 is multiplied by the 10% increase, resulting in a 66% increase of total equity for the household. By comparing this to the potential outcome if the household were to invest only 400 tkr of equity into their purchase, the solidity would realize at 10% by formula and the leverage would equal to 10. This makes the increase in equity for the household at a 10% increase in house prices to realize at 400 tkr. Indicating that the percentage increase in equity would be 100%. Therefore, the higher leverage the higher return to equity. The effect of leverage does however go both ways, denoting that a decrease in value will have the opposite effect. With a low solidity and therefore a high level of indebtedness, decreasing asset prices will lead to multiplicative losses in the household equity. To illustrate this the former example can be continued where the initial household invests 600 tkr of equity into real estate of 4 000 tkr, realizing an indebtedness level of 85%. If a decrease in value of 10% were to occur, the household equity would decrease by 60%. The effect of leverage does therefore hold significant power towards the exercisers, enabling both immense positive and negative outcomes (Fregert & Jonung, 2018, 77-78).

1.3.2 Supply and demand in the mortgage market

The theory of supply and demand is a central topic within the field of economics and is a mechanism which can explain various different markets and economic behaviors (Mankiw, 2017, 266). Demand is the behavioral component of the buyers, and it represents the quantity that buyers are demanding in a certain market. Many different factors can affect the demanded quantity but by the law of demand, all else equal, a drop in price should increase quantity demanded (Mankiw, 2017, 67). Factors that might affect quantity demanded could be prices of related goods, number of buyers or expectations. Buyers are households that demand a certain financial product, a mortgage. By the law of demand a decrease in interest rates, which states the cost for a mortgage, should increase the demand for a higher nominal mortgage (Mankiw, 2017, 67).

Supply indicates the sellers' willingness to trade a specified quantity. As with the demand side several factors can influence the sellers' willingness to supply a certain quantity, but as would be expected price is a highly influential part. If the price can be set high, profits increase, and more sellers want to enter the market and supply a high quantity. Conversely, a low price induces sellers to supply a lower quantity, rendering some markets without sufficient suppliers if market prices are below suppliers demanded profitline. The law of supply states that all other things equal, supply should increase when the price increases and by same logic decrease with decreasing prices (Mankiw, 2017, 73).

Supply and demand within the loanable funds market rely on the fundamental mechanisms discussed above but induce specific adjustments. The supply of capital which can be restructured into mortgages originates from households that have an abundance of income and want to save it in a bank account. Saving is therefore the supplying source of loanable funds. The demand is induced by the willingness of households to make investments, such as into a house. Demanded mortgages are therefore rooted in investments wanting to be made. The price that establishes the equilibrium within the loanable funds market is the interest rate. It represents the amount that borrowers are willing to pay to lenders supplying the capital. As the interest rates increase, borrowing becomes more expensive, but at the same time makes saving more attractive. The demand curve for loanable funds slopes downward and the supply curve slopes upward. By adjusting the interest rate, an equilibrium can be achieved, rendering both suppliers and demanders' satisfied (Mankiw, 2017, 266-267).

1.3.3 Arguments for free trade

Rarely implemented fully but often considered an ideal model, the concept of free trade has influenced many trade agreements and been a source of inspiration for political proposals. The main idea is that free trade will create efficiency gains that induce wealth, although many economists think that the concept actually produces more advantages than that (Kommerskollegium, 2019). The opposite of free trade is protectionism. Protectionist measures are implemented to protect domestic goods and services from foreign competition. In the field of economics, protectionism could be interpreted as discriminating towards foreign firms (Kommerskollegium, 2019). While tariffs and quotas are widely used means to attain this policy, it can also be done through unjust national trade rules which obstruct trade. The opposite of protectionism, free trade is therefore about non-discrimination of foreign companies, abscence of tariffs and quotas (Kommerskollegium, 2019).

The argument for efficiency gains can be understood in terms of consumer and producer welfare. When a tariff is implemented the price increases, which reduces demand and induces a welfare loss of the size of the producer and consumer surplus lost. In a situation of free trade and without tariffs, the opposite logic applies, resulting in welfare gains. Other additional gains of free trade are economies of scale which can be accomplished through the enlarged market that free trade enables. A small country without trade will not have markets of sufficient size to obtain the economies of scale that can be found in larger markets. Therefore, free markets and fair competition are more important for small and export-oriented countries (Melitz et al., 2014, 269- 270).

Furthermore, open markets and free trade increases the level of competition in markets which creates incentives for innovation and productivity, forcing less efficient companies out of business (Melitz et al., 2014, 270). When free trade is hindered by the use of import quotas, domestic companies can find themselves in a situation where it's economically beneficial for them to spend resources on lobbying politicians to maintain or increase quotas already in place. Such a behavior is called rent seeking and can have societal costs since parts of the productivity is spent on benefitting the specific company. Decreasing the overall welfare due to reduced competition (Melitz et al., 2014, 271).

The European Single market is the common marketplace of the European Union which tries to incorporate these previously stated advantages. The result is in 2022 a market of 450 million consumers and 27 countries that is contributing to growth and facilitating trade for

consumers and companies in the union (Utrikesdepartementet, 2019). The Single market is built upon the principles of free movement of people, goods, capital, and services. Regulation is harmonized through EU legislation, which is making it easier for companies to export, thus lowering costs and increasing trade (CECE, 2022). According to the Swedish government, the Single market is an important factor for Swedish economic growth, unemployment, and international competitiveness. As much as 70% of Swedish export goes to the Single market and the corresponding number for import is 80%. 730 000 jobs in Sweden are supported by export to the single market, highlighting how important the Single market is for Sweden's economy (Utrikesdepartementet, 2019).

2 Methodology

In the following section restrictions to the thesis will be presented in order to motivate the chosen variables as well as discussing boundaries when conducting a time series regression analysis. This is followed by an introduction of the main method used in this thesis, regression time series analysis. The section also provides information about the data, including a presentation of the chosen variables.

2.1 Restrictions to the thesis

This thesis is restricted by data availability of 34 years, which is from 1987 to 2020. This is because the independent variable policy rate only has reported data from 1986 and onwards, restricting the thesis to a smaller dataset than initially requested. With a large sample the degrees of freedom increases and with many degrees of freedom the independent values are free to vary in between these degrees, indicating that the validity of the null hypothesis can be more accurately interpreted (Stock & Watson, 2019, 80). To omit variables due to the lack of reported data does however also imply problems as this decreases the possibility to answer specific research questions. Omitted variable bias occurs when relevant variables are neglected resulting in the model attributing the missing effect on other variables included in the regression (Stock & Watson, 2019, 368). Furthermore, prices for apartments are excluded since it isn’t available from before 2002, rendering the variable house prices to only include data for houses as this is available throughout the whole observed period.

The chosen independent variable policy rate originates from not being able to obtain data for the average interest rate on mortgages. If this data were to be available that might indicate stronger correlation to the debt ratio as this is the actual cost that exposes the household disposable income. Banks did not however need to disclose this information until 2015 rendering the sample too small for this study (Finansinspektionen, 2015). The policy rate

does however affect the households through the financial mechanisms as banks borrow from the central bank at a set repo rate, which is then reflected in the interest rate supplied to the public through various margins and cost surcharges (Mankiw, 2017, 511). Using the policy rate in the thesis does therefore include the effect of interest rate cost for households and allows for observation of the entire period from 1987 through 2020.

2.2 Explanation of chosen variables

The data in the selected sample includes 34 observations ranging the years of 1987 through 2020. The dependent variable is the Swedish debt as a ratio to disposable income. Whilst the chosen independent variables are the policy rate, housing prices, financial assets, mortgage bonds, inflation, as well as a dummy variable used to indicate the years since Sweden became a member of the European Union. By including the dummy variable this thesis can particularly examine the effect of policies and free trade connected to the single market in the EU and its impact on Swedish indebtedness. Below follows a presentation of the chosen variables and a discussion of why they provide relevant information about the dependent variable and research questions.

Variable	***Measurement***	***Source***
Debt ratio	Yearly	SCB
The Swedish policy rate	Yearly average	Riksbanken
Housing prices Index	Yearly Index	SCB
Financial savings	Yearly	SCB
Mortgage bonds	Average Yearly	Riksbanken
Inflation	Yearly	World Bank
Joining the European Union	Dummy =1 from ≥ 1995	European Union

Tables are available at: www.scb.se, www.riksbank.se/sv/statistik/ and www.data.worldbank.org/

(Table 1.)

2.2.1 Debt ratio

The debt ratio is measured as debt in relation to disposable income. In this thesis the object is to examine the possible variables that can affect this ratio. The debt ratio is especially interesting as it provides information about the exposure of households towards shocks in the economy. With higher indebtedness, shocks to the national economy and in prolongation the household economy, can cause more severe consequences. An increase in the policy rate can for example have an extensive effect on the household savings ratio as more disposable income will have to go towards paying interest rates (Jeffrey R. Campbell and Zvi Hercowitz, 2006, 20).

The data for indebtedness is gathered from Statistiska Centralbyrån (SCB) where the measure is specified as debt in relation to disposable income. This specific data is measured as the household loan debt as a percentage of disposable income. Disposable income is specified as the full year income reduced by taxes and fees which can be spent by the choice of the household. This includes income from labor and income from capital such as dividends (Statistiska Centralbyrån, 2020.). It further specifies the net of disposable income which implies that depreciation is deducted from financial and real assets. On a national analysis level, the net is often used, while comparison between countries most benefits from the gross disposable income as depreciation differs between countries (Statistiska Centralbyrån, 2022). A household is specified as a living space without requirements for number of people living there or ages for the residents. As of 2021 a total of 4,8 million households were recorded (Statistiska Centralbyrån, 2022).

2.2.2 The Swedish policy rate

The Swedish central bank, Riksbanken, is responsible for financial stability and low inflation in Sweden. According to Swedish regulation, the target for inflation rate with a fixed interest rate (CPIF) is two percent annually. In addition, Riksbanken should strive to achieve financial stability which is fundamental for sustainable growth and high employment. To reach these goals Riksbanken uses the policy rate, also known as the repo rate to steer the economy and determine the rate that banks can borrow money for. On an aggregated level, the policy rate decides what rate consumers and corporations are paying for loans which influences the level of economic activity (Sveriges Riksbank, 2018). By lowering the policy rate when the economic development is poor, Riksbanken can raise the aggregate demand in the economy for consumption and investments which affects the economy positively. The same logic applies when inflation is high and Riksbanken chooses to raise the policy rate in order to lower economic activity (Persson, 2018, 26-29). This thesis uses the policy rate from 1987-2020. As the background illustrates, the policy rate has been particularly low since the

financial crisis in 2008 and onwards. Since a low policy rate makes borrowing cheaper, demand for housing loans is supposed to increase which will raise housing prices.

2.2.3 House prices

When housing prices increase, nominal debt will increase as well since larger loans are required to purchase a property. Historically, housing prices have increased more than disposable income over the last 20 years (Statistiska centralbyrån, 2022). According to Finansinspektionen (FI), the increase in housing prices is an important reason why the debt ratio has increased (Finansinspektionen, 2021). For that reason, this thesis is including house prices as a variable to investigate whether it had any effect on the debt ratio. From emperics it's known that mortgages make up a significant share of the total debt for Swedish households. The average loan-to-value ratio in Sweden for small houses in the year 2020 was 64 % (Finansinspektionen, 2021). If the prices for houses increase, loans will have to grow as well, inducing an increase to the debt ratio.

The effect of leverage and the historically strong performance of investments in housing could create a climate where people believe that housing prices will increase in the future because they have increased in the past, ergo increase speculation and the risk of a housing-bubble. To measure the effect of increasing house prices on the debt ratio the variable house prices is used where data for small houses between 1987-2020 is included. The choice to exclude prices for apartments was made because data wasn't available before 2002. Thus, the data collected in this study consists of prices on small or detached houses for permanent residence. However, that shouldn't be a problem since it's reasonable to assume a high correlation between the increase in prices for small houses and apartments. Including both variables could cause multicollinearity (Watson & Stock, 2019, 228-231).

2.2.4 Financial savings

The variable financial savings is gathered from the Statistiska Centralbyrån (SCB) and shows the savings ratio for Swedish households. Financial savings such as stocks, bonds and bank accounts are accounted for and compared to disposable income. The chosen variable excludes real assets such as houses or apartments because most of the real assets are funded by mortgages or other debt. As of 2020 the average loan-to-value ratio is 64% and the total amount of mortgages in Sweden account for 40% of the total residential value (Finansinspektionen, 2021). Therefore, it is excluded in order to not include outstanding debt twice in the model. Furthermore, the chosen variable excludes financial savings that are acquired through occupational or premium pension. This is because the object is to observe

the actual savings that can be used by households and affect their ability to take on credit. Assets such as pensions often have a set date when they will be accessible and are therefore not adequate collateral (Nordea, 2022). If a household has financial savings the access to credit increases due to a higher ability to pay loan related costs. From the banks perspective the risk decreases when the borrower has sufficient financial savings that can be deposited as collateral or just imply a high payback ability (Nordea, 2022).

Financial savings can also have an effect on the willingness to obtain debt as the effect of leverage comes into play. With higher financial savings there are incentives to invest in various other financial activities such as bonds or stocks. The savings might induce a higher yield in these activities than being tied up to a real asset like a house. By taking on debt, households can use the effect of leverage and therefore increase their total financial gain, given that the interest rate is low and that house prices are expected to rise (Michelangeli, 2011, 2). By including this variable, the aim is to account for the effect of financial savings on the debt ratio. Examining if there is a negative or positive relationship between household savings and household debt.

2.2.5 Mortgage bonds

A mortgage-backed security (MBS) or mortgage bond is a financial instrument secured by various outstanding mortgages. It is an aggregated product where a large number of mortgages are collected as security and afterwards sold to governments or investment banks. The structure of this instrument is known as pass-through where principal payments and interest is paid from the household to the mortgage bond holder. A mortgage bond is therefore secured by the pooling of mortgages of real assets such as houses and yields either monthly, quarterly, or semiannually (Baig & Choudhry, 2013).

These instruments are known to be of high liquidity defining that they can be sold or traded at any time during the issued term. The face value of the instrument decreases over time since mortgages are not paid back in entirety like bonds or fixed-income securities, instead it is repaid alongside the interest rate in its periodic payment. These bonds can be issued by various structures such as tranches, giving right to different levels of priority to the debt payment. During the financial crisis of 2008 a large number of subprime MBSs were repackaged and resold as collateralized-debt obligations with wrongfully issued risk-ratings (Clark, 2008).

Mortgage bond securities are mainly issued by credit institutions such as banks with the main focus to supply the mortgage lending with sufficient capital. There is therefore a distinct connection between mortgages outstanding to households and these securities. With increasing house prices larger mortgages need to be issued, implying that even more MBS needs to be issued in order to raise the needed capital (Baig & Choudhry, 2013). Therefore, a correlation between mortgage bonds and the debt ratio can be suspected.

2.2.6 Inflation

Prices tend to rise over time, when it happens to the overall price level it's called inflation. The most common measurement of inflation is called the consumer price index (CPI). The CPI is calculated by collecting prices for a large number of commodities and services and comparing them with the previous period. An additional measurement is the CPIF which is the CPI but with a fixed interest rate. Since 2017 it is the measurement that Riksbankens inflation target is evaluated on. The CPIF is regarded as a better measurement because it hinders certain problems. One such flaw can be illustrated by the following example: If Riksbanken wants to lower inflation by raising the interest rate, the cost of mortgages will increase which is pushing the CPI upwards, resulting in a more ambiguous measurement since the effect of mortgages goes in the wrong direction. According to the inflation target in Sweden, Riksbanken should aim for a policy that results in an CPIF annual inflation of two percent. (Sveriges Riksbank, 2022).

A low and stable inflation is desirable which is why Riksbanken has this goal. A consequence of the opposite is an unjust distribution of wealth. The opposite of inflation is called deflation and consists of decreasing prices. In a situation of deflation people with debt will see their nominal debt unchanged while their income will decrease, making the debt bigger in relative terms. A situation that occurred during the end of the 19th century in the US, with people struggling to pay off their debt (Mankiw, 2017, 344). Hyperinflation is used to describe inflation that is extraordinarily high, a state that is deterrent for most economists. The quantity theory of money is most often used to understand the mechanisms of inflation. It consists of the following parts (Gottfries, 2013, 191):

$$Quantity\ theory\ of\ money:\ M \times V = P \times Y$$ *(Equation 3.)*

M= Money supply V= Velocity of money P= price level Y= Output of goods and services

Empirically, V has been stable, which implies that if the central bank increases the supply of money, either the price level or the output of goods and services must increase proportionally.

Output is determined by labor, physical capital, human capital, natural resources, and the level of technological production. Thus, money does not affect output. Therefore, it can be derived that when the supply of money changes, the price level will change proportionally (Mankiw, 2017, 349-352). The data used is collected from the World Bank which is measuring the percentage increase in consumer prices.

2.2.7 Sweden becomes a member of the European Union

The 1st of January in 1995, Sweden joined the European Union together with Finland and Austria. In 1994, approximately 52% of the Swedes voted yes in a referendum about membership to the union (Europeiska kommissionen, 2022). In this thesis, a dummy-variable is used to test whether the membership in the European Union has had any effect on the debt-ratio. All years from 1995 and later are equal to one and previous years are equal to zero within the regressions.

The single market of the European Union consists in 2022 of over 450 million consumers and 24 million companies. The idea behind the single market consists of free movement of goods, services, people, and capital between the members of the European Union as well as the countries in the European Economic Area (EEA) Iceland, Liechtenstein and Norway (Utrikesdepartementet, 2019). Free movement facilitates trade and is essential for the common market. The principles that constitute the foundation are the following (Kommerskollegium, 2019):

- *Common rules for competition, procurements, goods, and services.*
- *Non-descrimination, which means that a company from another EU-country must not be treated differently than a domestic company.*
- *Mutual recognition, the right for a product or service to be accepted in the whole common market if it has the required authorization in its home-market.*
- *Proportionality, which states that a country that is demanding certain standards on goods to protect environment and health should strive to hinder trade minimally.*

Since Sweden became a member of the union and gained access to its inner market export has increased significantly. Swedish export of goods to the EU has increased 158% or 600 billion SEK from 1995 to 2018, for services the export rose 121% or 235 billion SEK from 2005-2018 (Utrikesdepartementet, 2019).

2.3 Econometric time series analysis

Time series data consists of information collected for one variable at several different time periods and can be used in order to answer quantitative questions. For example, if there is a causal effect on dependent variable Y as the independent variable X changes (Stock & Watson, 2019, 554). In this specific case the question states if there is a causal effect on the debt ratio of Swedish households when testing the various chosen independent variables. There are no limitations or specific amounts of time periods that need to be gathered allowing the analyst to choose which specific periods of interest to be included (Stock & Watson, 2019, 554).

Time series analysis can be used in a variety of ways and do not have to be of financial nature. Common usages are such as analyzing population growth, diseases or observed heart rate. Within economics it is however a useful tool as it allows for examining relationships between variables such as stock prices (Stock & Watson, 2019, 556). Time series analysis can in this case be implemented by obtaining closing stock prices for a given company over a specific period. This data is afterwards structured in a chronological order and complemented by relevant variables such as for example GDP, unemployment rate or changes in trade balances. Time series analysis does therefore start with the establishment of research goals and relevant variables whereby processing the data in this way allows to examine reliable relationships between the dependent and independent variables (Stock & Watson, 2019, 560).

One specific property of time series data that differs from cross sectional data is the impact of time. The positive implications of this are the ability to analyze not only change over time but also the impact of time. Another property is the transferability of effects through time periods such as the debt in time t_1 impacts the debt observed in t_2. This does however imply some problems as to analyzing the data as effects of variables rarely can be assumed to be independent of time. It can for example be a realistic problem to argue that the house prices of t_2 is unaffected by the prices observed in the previous period t_1. Most certainly will the prices observed in t_2 have a strong correlation with the prices in the earlier period as this sets the starting point for future observations (Stock & Watson, 2019, 555).

In contrast to cross sectional data, time series data cannot be randomized in a sample which implies that specific assumptions are needed in order to achieve reliable results (Wooldridge, 2016, 40).

1	Linear in parameters:	$y_t = \beta_0 + \beta_1 x_{t1} + \beta_2 x_{t2} + ... + \beta_k x_{tk} + u_t$
2	No perfect collinearity	
3	Zero conditional mean	$E(u_t \mid X) = 0,\ t = 1, 2... n$
4	Homoscedasticity	$Var(u_t \mid X) = var(u_t) = \sigma^2, t = 1, 2... n$
5	Normality	$(0, \sigma^2)$

(Table 2.)

When using time series data, the assumptions one through three must be satisfied in order to assume that the ordinary least square is unbiased. This implies that the independent variables do not affect unobserved factors. Assumptions one through five must be satisfied in order to conclude that ordinary least squares are the best approximate linear function that processes the data without systematic faults. If all of the stated assumptions are satisfied, t-values, f-values and standard deviations can be reviewed with confidence. These properties therefore need to be fulfilled in order to achieve reliable and relevant results from the time series regression (Wooldridge, 2016, 303-304). In section 2.4, time series diagnoses will be tested and discussed in order to satisfy these stated assumptions.

2.4 Time series diagnoses

It is common that time series data contains seasonality. Trends need to be removed and adjusted for since it might otherwise cause a varying mean over the chosen timespan. Whereas seasonality might result in an unstable variance rendering the data to be non-stationary. The data needs to be stationary in order for it to be adaptable in the modeling process (Brownlee, 2017). The following tests and methods are in order to find these trends or seasonality and to adjust for them.

2.4.1 Control for drift

When controlling for drift in the dataset all variables are plotted and examined for a deterministic trend, searching for a monotonically variation over time. After the visual control of the plot a regression with the variables is conducted to decide if the variable has a non-zero mean which implies that the variable has a drift. This is repeated for all variables in order to assert which variables need to be adjusted.

2.4.2 Ljung-box test

After asserting which variables that need to be adjusted a series of regressions are conducted to test the number of lags that needs to be included in order to pass the Ljung-box test. This starts by regressing the arbitrary large $p = 10$, where p indicates the number of lags, and subsequently removing one lag until a significant lagged variable is encountered. When a significant lag is found the number of lags is decided according to $p = x + 1$. After choosing the appropriate number of lags for each variable, autocorrelation in the error term is controlled for. If the test is able to reject, the next step is to test $p = x + 2$, $p = x + 3$ and so on, until the Ljung-box test is passed (Brockwell et al., 2002, 36). Further, the chosen number of lags are tested by predicting the residuals into a corrgram which is a graph of correlation matrix. This shows if the number of chosen lags is appropriate or not. Implying that some variables in fact receive different final lags than interpreted by the initial Ljung-box test.

2.4.3 Augmented Dickey Fuller test

In the Augmented Dickey Fuller Test (ADF) the null hypothesis states that the variable has a unit root. The object is to reject this hypothesis by comparing the negative number received from the test with the critical values. As the number becomes increasingly negative the stronger a rejection of the hypothesis of a present unit root can be made (Watson & Stock, 2019, 586). This test is applied to all variables with the applicable lags determined in the Ljung-box test above. Let's recall that the data includes 34 observations, the critical values chosen by the observations are the following:

	Without trend		**With trend**	
Sample size	1%	5%	1%	5%
t= 25	-3.75	-3.00	-4.38	-3.60
t= 50	-3.58	-2.93	-4.15	-3.50

(Table 3.)

2.4.4 First-differencing

After the conducted ADF tests, first-differencing might be needed for variables in order to adjust for unit root. First-differencing is conducted as follows by formula:

$$\Delta y_{it} = y_{it} - y_{it\ -1} = \Delta x_{it}\beta + \Delta u_{it}, t = 2, \ldots T$$

After first-differencing, the variables show the change between periods rather than the nominal value. First-differencing is used in order to adjust for omitted variables causing omitted variable bias. The fixed effects between periods are eliminated by transforming them to first-differenced variables. Since the intercept is deleted by the differencing, an interpretation of the intercept can no longer be made (Stock & Watson, 2019, 555). The preceding steps are then repeated in order to find the appropriate lags with the differenced variables. The same logic is followed rendering the lags to $p = x + 1$ where x is the significant numbered lag. The chosen number of lags is tested with a prediction of residuals in a corrgram. With first-differenced variables and correct number of lags Augmented Dickey Fuller tests can be conducted once again in order to reject the null hypothesis of present unit root.

2.4.5 Co-Integration

In some datasets several series might share the same stochastic trend which is referred to as cointegration. In order to show long-run relationships with time series, additional methods are needed. If two or more time series share stochastic trends they might behave and move close to one another over the long run that they appear to have the same trend component, ergo a common trend. If the time series share such a stochastic trend, they are said to be cointegrated (Watson & Stock, 2019, 663).

This is tested by predicting the residuals in the long run relationship regression number one. The variable vhat is then tested with Ljung-box test and assigned applicable number of lags by previous stated logic. The variable including predicted residuals is then tested with Dickey Fuller test which will indicate if it's possible to reject the null hypothesis of a present unit root. If a rejection of the hypothesis is possible it can be concluded that the variables are cointegrated. With the use of preceding tests and unit root corrections regressions can be constructed with better confidence of the regressions showing reliable results.

3 Results and analysis

In the following section the results from the estimated regressions will be presented. Firstly, the processing methods used in order to correct for unit roots to make the data stationary are explained. Finally, each test conducted is presented in a separate section below, followed by an overview and analysis of the results.

3.1 Results of time series analysis

When conducting the preceding methods for time series diagnoses the presented steps are followed in order to clear the data of trends and drifts. In round one we examined which variables that included a drift or trend. Concluding that all of the variables included either a drift or trend, rendering the data non-stationary. To correct this, the first Ljung-box test was conducted in order to decide the number of lags to include for each variable by the instructions presented above. Corrgrams were conducted in order to test the chosen number of lags. With a sufficient number of lags the variables are tested in a Dickey fuller test, rendering most variables not being able to reject the null hypothesis of a present unit root. In round two the variables are first-differenced in an attempt to remove trends and drifts of the data. The first-differenced variables are then controlled for lags with the Ljung-box test once again followed by the corrgram as presented earlier. With first-differenced variables and lags chosen by the Ljung-box test and corrgram a new Dickey fuller test is conducted in order to

control for unit root. In this test all variables are able to reject the null hypothesis of a present unit root. Rendering the data stationary.

3.2 Regression Models

In this following section the final regressions used in the study is disclosed. All variables that are first-differenced are indicated by an initial "*d*". The letter "*L*" followed by a number indicates the number of lagged variables used.

First regression- *Representing the stable long run relationship of the Swedish debt ratio.*

$$Debt = \beta_0 + \beta_1 Mort + \beta_2 Policy + \beta_3 Inflation + \beta_4 Fin + \beta_5 House + U$$

Second regression - *Error correction model, adjusted with first-difference and lags*

$$dDebt = \beta_0 + \beta_1 L1.dDebt + \beta_2 L2.dDebt + \beta_3 dMort + \beta_4 dPolicy + \beta_5 dInflation + \beta_6 dFin + \beta_7 dHouse + \beta_8 L1.dHouse + \beta_9 L2.dHouse + \beta_{10} L.vhat + U$$

Third regression - *Error correction model with Sweden joining the EU*

$$dDebt = \beta_0 + \beta_1 L1.dDebt + \beta_2 L2.dDebt + \beta_3 dMort + \beta_4 dPolicy + \beta_5 dInflation + \beta_6 dFin + \beta_7 dHouse + \beta_8 L1.dHouse + \beta_9 L2.dHouse + \beta_{10} L.vhat + \beta_{11} I(t \geq 1995) + U$$

(Table 4.)

$Debt$	The household debt as a percentage of disposable income in time t
β_0	The constant
Mort	Five-year mortgage obligation security bond, specified in yield percentage
Policy	The policy rate set by Riksbanken
Inflation	Annual consumer price inflation
Fin	Financial assets ratio to disposable income. Excluded for real assets
House	Yearly change in prices for houses in Sweden, excluded for apartments
$I(t \geq 1995)$	Dummy = 1 since Sweden became a member of the EU in 1995
Vhat	Residuals from regression 1, stable long-term relationship

3.3 Expected results of the regression

Prices for small houses are expected to be strongly correlated with the debt ratio. Most people finance their housing purchases with loans which is why the debt is assumed to increase when prices of housing increase. Higher house prices do not affect income, so when house prices and debt increase, the ratio increases as well.

The hypothesis would imply that financial savings has a positive correlation with the debt ratio. When financial savings increase the households are able to demand more expensive houses which is expected to increase prices and debt according to supply and demand logic. Furthermore, according to the theory of leverage, more equity increases access to credit. Thus, financial savings should have a positive effect on debt. At the same time there are multiple forces at play. Financial savings may also provide returns such as stock dividends that will increase disposable income which lowers the debt ratio. It is also likely that people with more equity prefer smaller loans, that is especially true for households that are risk averse.

It is expected that the policy rate will be negatively correlated to the debt ratio. The intuition is that a lower policy rate means that borrowers can buy more expensive housing since loans come at a lower cost. Therefore, the demand for housing should increase, which creates an upward pressure on prices (Riksbanken, 2017). Thus, the debt increases while the income is not affected which enlarges the debt ratio.

Mortgage bonds are suspected to be positively correlated with the debt ratio, since the interest rate of mortgage bonds is influenced by the market interest rate (Swedbank, 2022). Mortgage bonds are a way for banks and financial actors to raise sufficient capital to offer housing mortgages. That creates a link between the demand for mortgages and mortgage bonds (Baig & Choudhry, 2013). Since inflation in theory should affect both housing prices and disposable income, the expected result for the variable is ambiguous. However, historically the debt ratio has increased significantly since the 90s, which indicates that housing prices have increased faster than disposable income and CPI (Statistiska centralbyrån, 2022). That could indicate that there's a positive correlation between inflation and debt ratio.

The dummy-variable that is the entrance into the EU and the European market is expected to induce an increase in the debt ratio. According to the theory of leverage households will take on more debt when they can which creates an upwards pressure on the debt ratio. The

argument is based on the assumption that the free market and free trade is profitable for the Swedish economy and followingly, the disposable income in Sweden.

3.4 Results and analysis of the regressions

The letter "*d*" indicates the first-difference variable, and the letter "*L*" followed by a number indicates the number of lags used for the variable. The significance level for each variable is indicated by (*) for a 10% level, (**) for a 5-percentage level and (***) for a 1-percentage level.

3.2.1 Regression I - The stable long run relationship

R-squared	0.9417	*(Table 5.)*
Regression 1	Coefficients	P > |t|
The constant	-73.62413	0.582
Mort	3.349557	0.100 *
Policy	-0.971695	0.443
Inflation	-0.4583442	0.715
Financial savings	-1.239087	0.006 ***
House	0.2024418	0.000 ***

In the first regression the stable long run relationship is examined through regressing the chosen variables excluded for corrections such as first-difference and the dummy variable for entrance to the EU. It is regarded as depicting the stable long run relationship since a cointegration model can make use of an equilibrium which implies an existence of a long-run relationship. If this equilibrium occurs a common stochastic trend has to be present amongst the different variables. That implies that the variables move away from the equilibrium in a periodic way (Kotzé, n.d.). Hereafter, the conclusions, and application of the first regression regarding Swedish Debt during the time period between 1987 and 2020.

Mortgage obligations have an increasing effect on the debt of Swedish households. It can further be concluded that it is statistically significant at the 10% level. This states that in the long run relationship for Swedish households during the period of 1987-2020, an increase in mortgage obligation yield also increased the household debt. This is as expected since mortgage obligations are a form of capital supply for the banks and are issued in order to

crowd sufficient funds for mortgages. An increased yield indicates an increased demand for capital which in turn indicates that an increased number of mortgages are being issued.

The policy rate might have a negative relationship on debt, as to say that an increase in the repo rate decreases the Swedish household debt in the specified time period. This is plausible since a higher policy rate implies a higher cost for the banks which in turn induces a higher interest rate for the households. With the law of supply and demand a higher cost should all else equal decrease demand. This variable is however not statistically significant at any common levels.

Inflation also correlates a negative relationship on the debt level which implies that higher inflation should have a decreasing effect on the recorded debt. This can be argued for by common macroeconomic theory as the policy rate is an instrument that can manage higher levels of inflation. With high inflation a common tool is to raise the policy rate which increases the costs of borrowing which should decrease economic activity and prevent higher inflation. The variable is however not significant at any common statistical levels.

Financial savings is stated to have a negative effect on debt and is also statistically significant at all commonly used levels. This effect can however be ambiguous since financial savings might inflict two effects on the debt ratio. With higher savings a household can access credit more accessible and to better terms. A household with high financial savings might however not want to take on debt as they can finance various investments by themselves. The negative effect recorded in the regression therefore tells us that Swedish households during the time 1987-2020 took on less credit the more financial savings they gained.

Lastly it can be concluded that house prices in the stable long run have a positive effect on the debt and are at the same time statistically significant at all common levels. This relationship is highly comprehensible since increasing house prices implies that an increased nominal number of mortgages has to be issued which therefore increases the household debt.

The first regression shows the long run stable relationship between macroeconomic variables and Swedish debt and furthermore shows us that mortgage obligations and house prices have been cointegrated since the variables share a stochastic trend, canceled out when combined. It can also be concluded that policy and inflation might be closely related by the regression and by common macroeconomic theory.

3.2.2 Regression II - Error correction model

R-squared	0.7639	*(Table 6.)*
Regression 2	Coefficients	P > |t|
The constant	0.1859635	0.874
dMort	0.3668706	0.706
dPolicy	0.0638978	0.920
dInflation	-0.926439	0.096 *
dFinancial savings	-0.4931329	0.119
dHouse	0.0458644	0.277
L.dHouse	-0.0082108	0.879
L2.dHouse	0.0207075	0.631
L.vhat	-0.0796183	0.396

The second regression is corrected for errors such as trends and autocorrelation per earlier stated methods. This regression does therefore include both a new variable “L.vhat” which includes residuals from regression one, the stable long run relationship, as well as lags for house prices. All variables have furthermore been first-differenced. Argumentations for variable relevance and signs continue to apply if not further commented.

Mortgage obligations do still inflict a positive relationship on debt but are no longer statistically significant. Policy rate has an increasing effect within the second regression as to the previously recorded negative effect. This is however also arguable to be correct since an increased policy rate increases the interest rate on issued mortgages. This is argued for by economic theory where an increase in policy rate decreases the disposable income by an approximately equivalent number. This states that a 1-percentage point increase in policy rate decreases the disposable income for Swedish households by approximately 1-percentage point (Riksbanken, 2017). The positive sign of policy rate is therefore plausible since the dependent variable is a ratio between nominal debt and disposable income. If the denominator, disposable income, decreases, the ratio increases. Ergo, an increased policy rate increases the debt ratio.

Inflation has a negative effect as previously recorded but is within this regression statistically significant at a 10% level. Financial savings inflicts a negative relationship as within the first regression, it is however not statistically significant. House prices follow the same logic discussed in regression one but is not significant at any common statistical levels.

The variable vhat contains, as previously specified, the residuals from regression one which depicts the stable long run relationship. This variable is however not significant, and we can therefore not conclude a presence of a long run relationship.

3.2.3 Regression III - Error correction model with EU variable

R-squared	0.8450	*(Table 7.)*
Regression 3	Coefficients	P > |t|
The constant	-5.602189	0.014 **
dMort	1.552547	0.094 *
dPolicy	-0.7118619	0.233
dInflation	-1.089335	0.024 **
dFinancial savings	-0.3414325	0.198
dHouse	0.0442932	0.210
L.dHouse	0.0128267	0.777
L2.dHouse	0.0132237	0.712
L.vhat	-0.026149	0.741
$I(t \geq 1995)$	7.647113	0.005 ***

In the third and final regression a dummy variable indicating the years since Sweden entered the European Union is included to examine if the membership had any impact on household debt. All other variables are equal to regression number two which is corrected for autocorrelation and trend errors. Previously stated arguments for signs and relevance continue to hold if not further commented. Mortgage obligation continues to have an increasing effect on the household debt and is within the third regression statistically significant at the 10% level. Policy rate has a decreasing sign as within the first regression and it continues to be statistically insignificant. Inflation has a negative sign meaning that an increased inflation decreases the household debt, this variable is further statistically significant at the

5-percentage level. Financial savings continues to inflict a negative relationship on debt but does not receive significance. House prices is consecutively of an increasing character as throughout all regressions but is not statistically significant in the final test.

The last variable depicting years of Sweden being a member of the European Union has a positive sign implying that the years of membership induced an increased debt for Swedish households. This is furthermore statistically significant at all commonly regarded levels, including the 1-percentage level. This presents evidence that the Swedish household debt has increased since the membership of the European Union began. A possible argument for this positive relationship is explained within the theory of free trade. Discussing low trade barriers and high incentives for countries to trade with each other, and further how an increased GDP is to be expected as countries can supply their comparative goods or services in an international context.

4 Conclusion

Reconnecting with the aim of the study the initial research questions can be reviewed in order to guide further conclusions. In the beginning of this thesis two research questions were asked to guide the work and influence the methods and theories applied. These questions as follows:

- *Which macroeconomic factors have influenced the debt ratio of Swedish households in the short run compared to the long run?*

- *Did the Swedish entry to the European Union affect the debt ratio of Swedish households?*

From regression one we can review the variables that affect the long run relationship of debt in Sweden where three variables are of statistical significance. The three significant variables are mortgage obligations, financial savings, and house prices. The variables that are insignificant are policy rate and inflation. One notable difference is that all of the significant variables are of accumulative form, meaning that house prices today most certainly accumulate over time with price increases building up from earlier years. The same goes for financial savings that often accumulates over a long time by households saving redundant disposable income.

This is in direct contrast to policy rate and inflation which fluctuates more often in the short run and are free to take on any value, at least in theory, independent of those reviewed in an earlier period. Mortgage obligations are by similar construction to the other significant variables as mortgages often run for long terms.

Thus, statistically significant results show that, in the long run, Sweden's household debt has been affected by mortgage obligations, house prices and the amount of financial savings made by households.

In the short run other findings arise as the models are corrected for autocorrelation as well as trends and drifts. By examining regression models two and three conclusions about which macroeconomic variables affect the debt in Sweden in the period of 1987 through 2020 can be made. The significant variables are mortgage obligations and inflation. With inflation becoming significant, in contrast to regression number one, it can be concluded that the debt of Swedish households by this time period were negatively affected by increases in inflation. Therefore, it can be concluded that the yield of mortgage obligations continues to be of significant effect for the household debt.

This work can further conclude that household debt in Sweden, in the years of 1987 through 2020, were significantly affected by the inflation and mortgage obligation yield.

By examining the third and final regression it can be observed that the variable depicting years of Sweden being a member of the EU, which is years after 1995, is statistically significant at all generally observed levels. This result indicates that European union membership has increased the household debt in Sweden. An explanation to this relationship can be found in economic theory for international trade where a removal of tariffs and trade barriers increases export and reduces consumer welfare loss. This implies an increased consumer surplus and with higher welfare more disposable income is received by the households. With higher disposable income more investments can be made and leveraged with a mortgage, benefits explained by the theory of leverage. The final conclusion is that the European Union has a positive correlation of the debt ratio of Swedish households during the time period of 1987 through 2020, a conclusion that can be argued for by economic theory but also supported by the conducted time series analysis.

This thesis provides knowledge on what macroeconomic variables have affected Swedish household debt, both in the short and long run. It is also investigating what effect the Swedish entrance to the European Union had on the household debt ratio.

4.1 Future work

This thesis has, mostly for limitation reasons and the lack of comparable data from different countries, focused on the national level. For future work, it would be interesting to broaden the perspective and conduct the research between countries as well.

Future work could as an example revolve around the opposite effect as in this study, discussing events and consequences connected to brexit. The heated debate during the last years discussing the relevance and benefits of the European Union, suggests that it's a topic of great significance. Future work could therefore revolve around examining how an exit from the EU might affect national debt ratios specifically or, as a more general topic, the economy as a whole. Vector error correction models can be estimated to further establish the cointegrating relationships between variables.

Bibliography

Baig, S., & Choudhry, M. (2013). *The Mechanics of Securitization: A Practical Guide to Structuring and Closing Asset-Backed Security Transactions*. Wiley.

Brockwell, P. J., Davis, R. A., & Davis, R. J. (2002). *Introduction to time series and forecasting*. Springer.

Brownlee, J. (2017, July 10). *How to Remove Trends and Seasonality with a Difference Transform in Python*. Machine Learning Mastery. Retrieved April 22, 2022, from https://machinelearningmastery.com/remove-trends-seasonality-difference-transform-python/

CECE. (n.d.). *European Single Market*. CECE.EU. Retrieved May 12, 2022, from https://www.cece.eu/industry-and-market/european-single-market

Clark, J. (2008). *How can mortgage-backed securities bring down the US economy? | HowStuffWorks*. Money | HowStuffWorks. Retrieved April 7, 2022, from https://money.howstuffworks.com/mortgage-backed-security.htm

C. Simon, A.O. Belyakov and G. Feichtingera. (2012). Minimizing the dependency ratio in a population with below-replacement fertility through immigration. *Theoretical Population Biology*, *82*(3), 158-169. https://www.sciencedirect.com/science/article/pii/S0040580912000718?via%3Dihub

Englund, P. (2018). Finanskriser. In *Tillämpad Markoekonomi* (pp. 54-55). Studentlitteratur.

Europeiska kommissionen. (n.d.). *Sverige*. European Union. Retrieved May 19, 2022, from https://european-union.europa.eu/principles-countries-history/country-profiles/sweden_sv

Europeiska kommissionen. (n.d.). *Sverige och EU-medlemskapet*. EU-kommissionen i Sverige. Retrieved May 4, 2022, from https://sweden.representation.ec.europa.eu/om-oss/sverige-och-eu-medlemskapet_sv

Finansinspektionen. (2015, February 17). *Snitträntа från 1 juni 2015*. Finansinspektionen. Retrieved April 11, 2022, from https://www.fi.se/sv/publicerat/pressmeddelanden/2015/snittranta-fran-1-juni-2015/

Finansinspektionen. (2018, April 4). *FI-analys - Bolånetaket har dämpat hushållens skulder*. Finansinspektionen. Retrieved April 15, 2022, from https://www.fi.se/contentassets/75646815adcd43bcbe15fed38a17bcdf/fi-analys_12.pdf

Finansinspektionen. (2021, March 24). *Den svenska bolånemarknaden 2021*. Finansinspektionen. Retrieved March 31, 2022, from https://www.fi.se/contentassets/1f11d50883754a7da8c217457e154d46/den-svenska-bolanemarknaden-2021.pdf

Fregert, K., & Jonung, L. (2018). *Makroekonomi: teori, politik och institutioner*. Studentlitteratur.

IG. (2022). *Vad är hävstång och hur fungerar handel med hävstång?* IG. Retrieved March 31, 2022, from https://www.ig.com/se/hantera-dina-risker/vad-ar-havstang

Jeffrey R. Campbell and Zvi Hercowitz. (2006). Welfare Implications of the Transition to High Household Debt. *Federal reserve bank of Chicago*, 20-22. https://www.chicagofed.org/publications/working-papers/2006/wp-27

Kommerskollegium. (2019). *Handla inom EU – principer och verktyg*. Kommerskollegium. Retrieved May 4, 2022, from https://www.kommerskollegium.se/importera--exportera/handla-inom-eu/

Kommerskollegium. (2019). *Protektionism*. Kommerskollegium. Retrieved May 5, 2022, from https://www.kommerskollegium.se/om-handel/utrikeshandel/protektionism/

Kotzé, K. (n.d.). *Cointegration*. Cointegration. Retrieved May 5, 2022, from https://kevinkotze.github.io/ts-10-cointegration/

Mankiw, N. G. (2017). *Principles of Macroeconomics*. Cengage Learning.

Maria, A. (2016). Long Run Economic Effects of Changes Age Dependency Ratio | St. Louis Fed. *Economic Research - St. Louis Fed*. https://research.stlouisfed.org/publications/economic-synopses/2016/09/02/long-run-economic-effects-of-changes-in-the-age-dependency-ratio/

Melitz, M. J., Obstfeld, M., & Krugman, P. R. (2014). *International Economics: Theory and Policy*. Pearson.

Michelangeli, V. (2011). Should you pay off your mortgage or invest? *Economics Letters*, *115*(2012), 322-324.

https://www.sciencedirect.com/science/article/pii/S0165176511005337?casa_token=59c-rLBi7tcAAAAA:UUa-R4vqroPAc-TUwRmx37rjQdIH7CLITpS_9BMMMthfJr8Gu6guh3hejvNvFE2c2GLmpg9qV8mS

Nordea. (2022). *Lån utan säkerhet och lån med säkerhet*. Nordea. Retrieved April 6, 2022, from https://www.nordea.se/privat/produkter/lan/skillnad-lan-med-och-utan-sakerhet.html

Persson, M. (2018). Penningpolitiken. In *Tillämpad makroekonomi* (pp. 26-29). Studentlitteratur.

Riksbanken. (n.d.). *FÖRDJUPNING – Hushållens skuldsättning och räntekänslighet*. Riksbanken. Retrieved April 22, 2022, from https://www.riksbank.se/globalassets/media/rapporter/fsr/fordjupningar/svenska/2017/hushallens-skuldsattning-och-rantekanslighet-fordjupning-i-finansiell-stabilitetsrapport-november-2017.pdf

Riksbanken. (2015). *Negativ reporänta införs | Sveriges Riksbank*. Riksbanken. Retrieved March 31, 2022, from https://www.riksbank.se/sv/om-riksbanken/historia/historisk-tidslinje/2000-2018/negativ-reporanta-infors/

Riksbanken. (2017). *FÖRDJUPNING – Hushållens skuldsättning och räntekänslighet*. Riksbanken. Retrieved April 18, 2022, from https://www.riksbank.se/globalassets/media/rapporter/fsr/fordjupningar/svenska/2017/hushallens-skuldsattning-och-rantekanslighet-fordjupning-i-finansiell-stabilitetsrapport-november-2017.pdf

Riksbanken. (2017). *Staff memo Hur påverkas hushållens kassaflöden och konsumtion av högre räntor?* Riksbanken. Retrieved May 4, 2022, from https://www.riksbank.se/globalassets/media/rapporter/ppr/svenska/2017/171220/staff-memo-hur-paverkas-hushallens-kassafloden-och-konsumtion-av-hogre-rantor.pdf

Riksbanken. (2019, June 18). *Riksbankens organisering och verksamhet – en historisk tillbakablick*. Riksbanken. Retrieved April 16, 2022, from https://www.riksbank.se/globalassets/media/rapporter/pov/artiklar/svenska/2019/190613/riksbankens-organisering-och-verksamhet--en-historisk-tillbakablick.pdf

Riksbankens uppdrag | Sveriges Riksbank. (2018, February 1). Riksbanken. Retrieved April 12, 2022, from https://www.riksbank.se/sv/om-riksbanken/riksbankens-uppdrag/

SIEPS. (2021). *Sverige och euron under 25 års EU-medlemskap*. Sieps. Retrieved April 22, 2022, from https://www.sieps.se/globalassets/publikationer/2021/sieps-2021_1-web.pdf?

Statistiska Centralbyrån. (n.d.). *Disponibel inkomst per konsumtionsenhet för hushåll 20–64 år efter hushållstyp 2019*. SCB. Retrieved May 19, 2022, from https://www.scb.se/hitta-statistik/temaomraden/jamstalldhet/ekonomisk-jamstalldhet/inkomster-och-loner/disponibel-inkomst-per-konsumtionsenhet-for-hushall-2064-ar-efter-hushallstyp/

Statistiska centralbyrån. (2022). *Hushållens låneskulder i procent av justerad disponibel inkomst och av hushållens finansiella tillgångar*. Statistikmyndigheten SCB. https://www.scb.se/hitta-statistik/statistik-efter-amne/finansmarknad/finansrakenskaper/finansrakenskaper-kvartal-och-ar/pong/tabell-och-diagram/arstabeller/hushallens-laneskulder-i-procent-av-justerad-disponibel-inkomst-och-av-hushallens-finansiella-tillg

Statistiska centralbyrån. (2022, April 8). *Hushåll i Sverige*. SCB. Retrieved May 11, 2022, from https://www.scb.se/hitta-statistik/sverige-i-siffror/manniskorna-i-sverige/hushall-i-sverige/

Stock, J. H., & Watson, M. W. (2019). *Introduction to Econometrics*. Pearson.

Sveriges Riksbank. (2022, February 18). *How is inflation measured? | Sveriges Riksbank*. Riksbanken. Retrieved April 12, 2022, from https://www.riksbank.se/en-gb/monetary-policy/the-inflation-target/how-is-inflation-measured/

Swedbank. (n.d.). *Bostadsobligationer - låg kreditrisk och hög avkastning*. Swedbank. Retrieved April 18, 2022, from https://www.swedbank.se/foretag/spara-och-placera/aktier-rantor-och-andra-placeringar/ranteplaceringar/bostadsobligationer.html

Utrikesdepartementet. (2019). *EU:S INRE MARKNAD*. Regeringen. Retrieved May 4, 2022, from https://www.regeringen.se/48f7a0/contentassets/95a76d2191b8415ab2352fcc0cebe5d8/eusinremarknadprio2019-2024_sve_web.pdf

Watson, M. W., & Stock, J. H. (2019). *Introduction to Econometrics*. Pearson.

Wisconsin Department of Health Services. (2019). *Age Dependency Ratios | Wisconsin Department of Health Services*. Wisconsin Department of Health Services. Retrieved April 7, 2022, from https://www.dhs.wisconsin.gov/wish/population/ratio.htm

Wooldridge, J. M. (2016). *Introductory Econometrics: A Modern Approach*. Cengage Learning.