The Swedish Housing Market
An empirical analysis of the real price development on the Swedish housing market.

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Abstract

This thesis discusses the real price development on the Swedish housing market and the effects by qualitative variables. The housing market shows signs of being overpriced and this paper investigates if these qualitative values significantly effect the real price development.

Valueguard Corporation has supplied Price development data. Focus magazine has supplied data regarding a large dataset for Swedish municipalizes which measures which state of quality of living prevailing in the investigated area.

Empirical results show that qualitative variables and increased population have a positive effect on the real price development. Increased cost of interest rates has a significant negative effect on the price development. Increased amortizing rates and interest rates are assumed to slow down an unsustainable price development.

Key-words: The Swedish housing market, Price bubble, Significance level, Causal relationship, Estimation
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1. Introduction
This chapter introduces the incentives with this paper, discussing the price development on the Swedish housing market and gives an insight for which problems will be discussed. The paper starts of by discussing the housing market in Sweden, explaining the problematic with a developing real price market.

1.1 Background
The real price development on the Swedish market continues to increase, which grows interest in how the market works and which parameters, makes the prices change. Previous research concludes that an open housing market should be affected by cost of interest and supply. As the Swedish population has been centralizing towards larger cities, increasing the demand for housing in these parts. Then the opposite should rationally apply for the municipals, which people are moving from. The population growth is therefore an interesting parameter to include in the model. These effects however doesn’t seem to revile the entire story which yielding interest in how qualitative variables as quality of living are reflected in the price development and if they are significant (Figure 1, Birch Sorensen, 2013).

1.2 Aims of the thesis
The increased cost of housing prices in the United States and the correlated effects on the American populations’ quality of living is analyzed by Roxanne Ezzet-Lofstrom in 2004. Ezzet-Lofstrom concludes that there is a correlation between increasing housing prices and the inhabitants’ quality of living. The initial theory of Roxanne Ezzet-Lofstrom was that increased housing prices should have a negative effect on the quality of living as the increased cost reduces the bundle of goods from a monthly income. The results in her paper however were contradictory to this theory as they indicated that the quality of living instead seemed to have a positive effect on the housing price market. This thesis aims at investigating if this effect is applicable on the Swedish housing market and if so, how it affects the housing price development. (Ezzet-Lofstrom, 2004).

The thesis aims at concluding how qualitative values as the quality of living affects the pricing development for housing over time. Defining the effects of these qualitative variables will yield an insight in how the future development on the housing market will change.

Deriving a model with respect to qualitative parameters into a quantitative model of the housing market will also help on predicting where to expect higher returns on capital investments on the housing market. This will also enable mortgage institutes to revalue their risk calculations of their return on investment with respect to the aspect of quality of living for a given area.

The empirics incorporate the results of an annual extensive semi-qualitative ranking system concluded by the Fokus time script. This variable combines variables that are hard to define quantitatively in a ranking system. For example “how well people like their municipal” is included in this ranking. It is believed that the social environment is important when purchasing housing and these values should then reflect in to the price development. This thesis also aims on describing the complexity of the market and strategies for how a price development can be controlled and how price changes may differ depending on the municipal size.
The empirical results will be compared to economic theories and later on it will be discussed if there is a market failure and how economic policies can adjust for this for the future.

The main idea behind this paper is to understand if qualitative parameters yield significant effects on the real price variations around in Sweden to be able to make forecasts for the future price development and to analyze which social aspects that are reflected in the price. This paper discusses how the Swedish housing market is affected by a semi-qualitative variable for a municipality’s wellbeing through the Xtabond2-model (Shiller, 2007).

The empirical analyses are made to analyze and minimize the risk on the real estate market and to try and explain the variation for the real price development in Sweden.

1.3 Price development on the housing market
This thesis aims at describing how qualitative parameters affect the price development for housing in Sweden. The central bank of Sweden concludes that the large increase in housing prices can be derived into fundamental aspects as people continuously move into the larger cities. This implies that the price increase should be centralized towards the largest municipalities in Sweden (Flam, 2014).

The housing market consists of products that may not need to follow the basic economical concepts. There is supply advancement on the market as housing is a necessary requirement for people having a place to live, which is a basic necessity for the society to hold. As the population is continuously growing, the demand for houses and apartments may be somewhat unsaturated in some districts. This could yield an inefficient price market with price surpluses exceeding the efficient price equilibrium level (Birch Sorensen, 2013).

My expectations is that there is a centralized monopolistic competition on the housing market as there tend to be more people attracted to live in the larger cities and this could reflect on the price development. This initial belief is based on that larger cities tend to offer greater job possibilities and has a higher population growth yielding increased high demand and hence higher prices (Birch Sorensen, 2013).

A common belief of the housing market in Sweden is that prices will always increase, which yields support from Figure 1. This reality is not able to continue, which will be discussed later in this paper. (Andersson, 2014)
Figure 1: The average price index development between 2005-2013 in Sweden (Valueguard, 2014)

To analyze the price index development in Sweden, the Swedish municipalities are evenly divided into 4 groups$^1$. The groups are based on the population from 2005 where the largest municipals are in group 4 and the smallest municipalities are in group 1. From analyzing Figure 2, one can see that the largest municipals have had the lowest relative price index growth rate. The results generate a question of which other parameters that affect the price development.

Looking at Figure 1, you are able to see the relative price index development between the years 2005-2013. This shows of an average price increase of 200% during the past decade around in Sweden (Andersson, 2014).

Figure 2 the price development of the Swedish municipals divided into 4 population size groups. (Valueguard, 2014)

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$^1$ The groups are divided by population sizes at year 2005 into Group 1: Populations larger than 60,000, group 2 populations between 30-60,000, group 3 populations between 22-30,000, group 4 populations smaller than 22,000 inebrians
1.4 Economic Sustainability

A continuous real price development on the UK housing market is an unsustainable economic development if the real income development per capita doesn't follow. House prices have increased rapidly during the last decade. As real house prices go up, people increase their amount of mortgages and people become more exposed of interest rate fluctuations (Bank of England, 2004).

The Swedish population is continuously spending larger parts of their real income on housing. This continuous change in allocating private resources is not economic sustainable as people need to spend their income on other goods. The effects and implications of this is discussed in this paper (SCB, 2011).
2. Theory
This chapter defines the problem of the current price development. Discussing the phenomena of price bubbles, the mortgage market and the macroeconomic aspects of a sudden fall on the real estate market.

2.1 Previous research and contribution for the future
The housing prices in Sweden are currently at a historically high real price level. Sprensen published a report on this matter for the Swedish institute of finance in 2013. Sorenson’s report aims at describing the current situation on the Swedish housing market to conclude if the market is overvalued. Figure 3 describes the average real price development for housing prices between 1952-2012. Prices have tended to fluctuate around a long-term equilibrium level between 1952-2000 but since then, real prices have increase rapidly. Sorensen’s report also concludes that the price-level increase has been especially strong in the centralized larger cities in Sweden (Sorensen, 2013).

The housing real price increase trend is a phenomenon that doesn’t only apply to Sweden but has been found in several other OECD countries concludes Sorensen. Shiller discusses the markets real price increase in USA and if there is a long-term trend in an increased price level or if the market is building up a price-bubble (Shiller, 2007).

Shiller finds that there has been a long-term equilibrium level and believes that the relationship should be constant over time.

<table>
<thead>
<tr>
<th>Percent</th>
<th>Real housing prices in Sweden, index value at 100%, year 1952</th>
</tr>
</thead>
</table>

Figure 3 Real house price developments in Sweden 1952-2012 (SCB, 2014)
Robert Shiller describes the housing market equilibrium according to Figure 4, where the stock of owner-occupied housing (H) is measured on the horizontal axel whilst the real price level (P) is described by the vertical axis. The long run supply of housing is measured by the LRS curve and the demand curves are described as D. The short run supply curves are shortened SRS in this simplified model (Shiller, 2007).

Figure 4 USA’s real price development on the housing market (Shiller, 2007).

Figure 5 The real price equilibrium market theory (Shiller, 2007).
Shiller states that as long as there is a positive margin between building housing and selling them, the housing market will continue to grow. Should prices fall on the market, than new constructions of housing will also tend to decline according to Shiller (Shiller, 2007).

To describe Shiller’s model, assume the market starts at $E_0^*$. This point is the first long term equilibrium between housing prices and the supply of housing. As the market constantly varies and as new incumbents tend to demand new housing with an increasing population, the demand curve shifts, $D_0 \Rightarrow D_1$. This yields an unsustainable Equilibrium at $E_1$. Shiller means that as this equilibrium, $E_1$, is reached, the market supply will start to increase. The increase in supply will continue until a new equilibrium is reached on the LRS curve. This movement in price is according to the supply and demand curve, as more housing is available, prices will decrease.

The construction and supply will continue until the market is in a state where the price level reaches its long-term price level at $E_1^*$. The $SRS1$ curve is an example of a situation in-between these equilibrium where the market continues to have a positive margin between prices and supply, $E_t$.

A problem with the housing market is that there are some limitations that hardens a constant long-term equilibrium rate. Limitations in land supply; infrastructural problems and construction restrictions are all examples of centralized monopoly advantages for some populated areas. Robert Shiller discusses this problem and develops his model for when a sustainable long run supply is applicable.

*Figure 6* aims at describing this more developed market where long-term prices can increase. Robert Shiller discusses a problem of the construction costs increasing at a pace that exceeds the real price increase due to for example real wage increases (Shiller, 2007).

This wage increase problem could of course yield problems as real wages increases; construction costs increases, yielding increased housing prices. Another problem worth discussing is the decentralized risks of building property on “unattractive” destinations, where communications and job possibilities are slim. Building property at these places might not reflect in the more popular centralized markets. This increase in supply might therefore not affect the increased demand for housing supported by an increasing population. Leading to a real increase in the housing price level.
Another problem with the Swedish housing market is the indirect development of the construction market. The Swedish construction market has had a relatively poor development in price levels. This problem is not only applicable to Sweden but towards a number of other European countries. The real prices of construction within these fields are higher than for example in the US. This yields to an increasing real price development for the housing market in Sweden.

Another large problem is the price increases due to land restriction. This is a direct effect on the construction market and hence in the new houses builds leading to an indirect effect on prices in the housing market.

Figure 6 Long run supply with a shortened in land (Shiller, 2007).

Figure 7 Agricultural land prices and consumer prices in Sweden (SCB 2014).
2.2 Price bubbles on the housing market
The housing prices are widely discussed in the media and people are discussing if there is a price bubble for the housing market that is on the tip of the breaking point. A value crash for the housing market in Sweden under this era of recovering from a deep financial crisis could yield tremendous negative effects on the economic society, both in Sweden but perhaps also have a spreading affect around Scandinavia and maybe even the Baltic’s and around in Europe (Andersson, 2014).

The real price development in Sweden for houses and apartments has increased rapidly since the 1980’s according to the Statistics Sweden, SCB, in Figure 8.

If we look in the period between 1986-1989 one can find a positive bump in our graph. This positive development was ended with the real estate crash in Sweden in the 1990’s. Looking at the long-term perspective, we find that the real prices continue to grow and exceed the time period local price irregularity.

This average exponential price increase is not only found in the Swedish society but can be derived in the housing markets around in Europe as of 2008, (Bank of England, 2014). The underlying cause for this real price increase is said to be an increased real income for the population, an increasing population as well as a more centralized society where a society is focused and specialized in the major cities. As people in the major cities becomes relatively richer, this should according to economic theory imply a higher purchasing power parity for demanded goods that in this case is houses and apartments. This would imply however that this exponential price increase would only occur in the largest cities of Sweden, which we can see from Figure 2 isn’t applicable for the Swedish price development as a whole (Krugman & Wells, 2009).
2.3 The housing market

The population in Sweden is continuously increasing, while the counter effect seems to apply for the amount of new houses and apartments build in Sweden has, Figure 9. The Swedish construction agencies have stated that the regulations and unsecure market structure increases the risk per capita spending for new houses. Therefore, the supply development has stagnated in several municipals and the building rate is too slow. Shortages in supply push up the prices (Villaägarna, 2013).

The housing market is a special market to investigate as it consists of goods that becomes price-changing assets. The goods sold on the housing market are both consumption goods as to be regarded as assets. Real estate can be regarded as a non-consumable and as an investment. The cost of owning property, as an investment, is maintenance costs and possible interest rate costs for mortgages. The property value believes to be affected by macro economical parameters, such as the current economic situation, the interest rate for capital lending, the nearby supply as well as the taxation rate. Therefore, basic economic theory may not fully apply towards analyzing the market. As each object on the market is unique, we find the apartments competing in many levels of monopolistic competition. The first competition is the close neighborhood, later the different parts of the municipal and later municipal vs. other municipals. Even though close by apartments are similar to the apartment you’re selling, it isn’t exactly the same and therefore compete with monopolistic advantages (Stiglitz, 2012), (Andersson, 2014).

Housing assets are often the largest purchase and cost of a household and usually a long-term investments, meaning that the same people own them for a longer period of time than other goods. Changes in monetary and fiscal policies as well as parameters for schooling, communications and elderly care might therefore change between different owners and this off course may have significant effects on the price development.

It is empirically shown that the private expenditure on property costs relative the private income continues to grow. People are simply spending more relatively money on their housing situation than previously and this phenomenon can’t sustain forever. The market real price development can’t increase forever, as people need to spend their income on other factors for the society to function economically. Leading to that the market hasn’t reached its long-term equilibrium point (SCB, 2011).

Looking at the price development since 1980, one can’t find long-term losses on the housing markets. Property is therefore regarded as a relatively safe long-term investment and this could be a reason for why people continue to buy at higher prices. When speaking of the real estate crash in the 1990’s it is known that the square price index for houses and apartments dropped rapidly as an effect of the highly increased interest rate set by the Swedish central bank as a reflection towards the economic situation in Sweden at the time. The market had however reached the same real price level after a seven year long recovery period and the prices has since then continued to grow. A reason for why this recovery of the 1990’s real estate crash happened so rapidly is belied to be because the Swedish economic climate changed, Figure 8. Sweden started to focus on a low inflation rate society and this affected the mortgage industry as it became much cheaper to buy a loan from the private banks. More money at lower
prices yields an increased purchasing power tending to increase the price level for goods. (Stiglitz, 1990)

The Swedish institution Boverket concludes in their report that the increased demand for property has occurred in Sweden during the past decade. The paper reports a declining relative relationship between the amount of new properties and the real population growth. Boverket also states in their conclusion that there is an asymmetry problem for the housing built and the demanded property, yielding that the price development for the new property doesn’t entirely affect the current demanded. This is an effect of a local monopolistic competition market (Boverket, 2012).

2.4 The Market Supply
The Supply is of course an interesting parameter when analyzing the price development on a supply and demand market. The housing market is somewhat special, as it needs to have a continuously growing supply due to a positive population growth. To hold a constant price equilibrium level, the supply increase need to fulfil the demand increase and this relationship hasn’t been consistent. The low increasing supply for property in the centralized cities is also believed to have significant effects on the rapid price increase recovery (Privata Affärer, 2014). This development seems to be low compared the population growth as people tend to move to apartments at younger ages and tend to live alone in longer periods of their lives. This phenomenon of a not enough supply for housing can be seen all across the municipals of Sweden (Bjurenvall, 2012).

![Figure 9 The amount of new houses and apartments build in Sweden between 1960-2010, (SCB, 2012)](image)

One do have to include the million housing project performed in 1965-1975. But there should be a positive trend as there is a percentage increasing population growth each
year. This should yield a relatively constant increasing relationship during the past 3 decades instead of the fluctuation variation as in Figure 9. (SCB, 2012)

2.5 The Housing market in United Kingdom

Comparing the Swedish housing market with the market in the United Kingdom, one can see a pattern that may be applicable in both countries. In the United Kingdom, house prices increased by over 200% during the decade prior the financial recession in 2008. During this period, the debt ratio per capita increased by 370% percent (Bank of England, 2014).

After the financial crisis, the housing prices in the UK dropped. This chain effected banks to act more carefully and the amount of money lent out dropped by more than 50 percent, resulting in stricter loan regulations making it harder to purchase mortgages. Economic theory concludes that as people aren’t able to lend as much as before, they are not able to pay as much as before, yielding the invisible hand to move the price index for the housing market in UK proportionally equal to the drop in the lending per capita (Smith, 1759 & Bank of England, 2014).

Even though average prices dropped by 11 percent, this did not reflect on the massive lending drop of 50%.

![UK House Prices: 1997 - 2010](image)

Figure 10 The variation in population, Housing Stock, Housing prices and Lending Secured on Dwellings during 1997-2010 in United Kingdom (Bank of England, 2014)

The missing proportion of the comparison between the drop in prices and the drop in the lending ration could possibly be explained by other parameters. This thesis will try to find which variables that also effects house prices and if there is a similar explanation in Sweden as in the United Kingdom.

2.6 Why and when prices would fall

As previously mentioned, there are discussions about the existence or non-existence of a Swedish real estate price bubble (Flam, 2014). This term is used to explain the situation where prices increase rapidly based on beliefs and expectations instead of rationality and an increased real value. This price increase can’t continue forever, leading to a burst and a massive drop on the market (Stiglitz, 1990).

As stated previously in this paper, there was a massive price drop on the Swedish housing market in the 1990s. The effects of this drop where massive in the short run,
but the real prices have continued to grow since. This could imply that the 1990’s price burst wasn’t really a burst for the entire bubble but basically a small puncture of a continuously growing bubble as it during the 90’s period and in that economic climate grew too fast. This however doesn’t need to imply that it was the end of the built-up real estate bubble. As the capital-lending ratio is the highest ever in Sweden, there might be reason to believe that we might have a bubble steadily growing. To analyze if the prices are growing in proportionally towards the expected economic changes in the society, it would be interesting to do an empirical research on this subject. (Lind, 2008)

Basic economic theory states a relationship between price and demand, which is a key conclusion for many developed theories. If increased interest rates should make it more expensive to purchase housing, or if the value should decrease according to for example an increased supply, than these parameters should be significant to the price development on the Swedish housing market according to the price and demand theory. This variable does not however have to yield significant effects, as other factors may be more important on the Swedish housing market than basic economic theory. This should in that case imply that our investigated market doesn’t’ follow an economical effective pattern. (Smith, 1759) (Englund, 2011)

2.7 The interest rate

The central bank uses the interest rate to adjust for macro-economic effects in order to control and maintain a stable inflation rate. As the economy is affected by recessions and booms in cycles, the central bank varies the interest rate to keep a consumption level and price development stable. As the central bank changes their interest rate, private banks tend to follow, Figure 11. As interest rates fluctuate, Adam Smith’s economic theory of the invisible hand concludes that since the price of mortgages varieties over time, the amount of mortgages purchased should fluctuate accordingly. As mortgages become lower, the price development should decrease. (Smith, 1759) (Riksbanken, 2014)

![Figure 11: The Swedish Central Banks interest rate variation during 2006-2013. (Riksbanken, 2014)](image)

2.8 The lending ratio

Figure 4 describes per capital lending ratio for Scandinavia and Germany during the 21st century’s beginning. However the per capita lending has not followed the same
pattern as the interest rates in Figure 12. Even though there was a significant drop in interest rates after the financial peak in 2008 the crisis didn’t affect the lending per capita accordingly.

![Figure 2: The average real price development in Scandinavia and Germany between 1999-2011 (Eurostat, 2014)](image)

The amount of money lent by the northern part of Europe has tended to increase stably over the past decade. This multicollinearity phenomenon is worrying for the future private economic development. This is also a reflection and assumed to be a significant reason to the stable and rapidly growing real price increase for the values in the housing market has been so over the investigated period (Eurostat, 2014).

### 2.9 Why a price increase is a problem

An increased real price level doesn’t necessarily imply a problem. If the real income for the society in Sweden should increase proportionally than this should only be an expected consequence of each other. The problem is that even though the real income increases in Sweden annually, the price index per capital tends to increase even more. This implies that the ability to be active on other markets gets reduced, as people tend to spend more and more money on their houses and apartments. Basically, we are not able to spend as much on other products in the markets and hence the country can’t develop and grow organically as before (Finansinspektionen, 2013).

The lending ratio has increased by over 100% during the past 18 years (Eurostat, 2014). This implies that the Swedish population have increased their private risk by twice as much of their real income on mortgages then in the mid-90s. This could and will yield severe problem if the development continues. The higher loaning ratio per capita, the more vulnerable is the private economy towards changes in interest rates. As interest rate may increase in the future, this could crash private economies around and yield a severe economic recession. Even though we have had a deep financial crisis, starting in 2008, the lending-capita ratio has continued to grow and this is alarming towards the Swedish economy as a whole (Finansinspektionen, 2013).

The Swedish financial supervisory authority has performed stress tests on the Swedish mortgage market and found that an increase in interest rate by only 5 percent units on the current interest rate would lead to that 6% of the population runs an economic
deficit. More than 65% of the Swedish population is currently in a state where they are living in houses that have been bought by 90% loaned money. These numbers are value adjusted and as property tends to increase in value, the population tend to increase their loaning from private banks (Finansinspektionen, 2013).

The Swedish financial authority is currently producing an extensive market value review and the prospect is that they will conclude that the Swedish housing market value is overvalued by up to 20%. Two important parameters that have affected this overvalue and which are analyzed are the mortgage-value ratio as well as the lending-income ratio per households. A reason for which the impact of the real estate crash in the 1990’s was so severe was due to the high lending-income ratio of 31%. This ratio has now increased to 46% of the total income. This increased vulnerability comes from mortgage institutions being able to lend out money at low unfixed interest rates. Should a crash occur, then these mortgage rates would increase and possibly yield greater macro-economic effects than the real estate crash in Sweden, 1990 (Finansinspektionen, 2013).

A reason for the housing market getting overpriced may come from speculation and expectations that prices will always continue to grow. “The great fool theory” explains the concept of how buyers are ready to pay higher prices for assets than of consumable goods (Fox, 2001). Even though the buyer knows that the value of the property is lower right now than what he’s paying, it might not be lower than when he’s selling the asset in the future. Therefore the market builds up a spiral of increasing values based on that the markets’ buyers expect the real prices to continue to grow. This concept of “the greater fool theory” as a phenomenon could actually partly be true on this market, as the market may not have found the long run real price equilibrium level. There has been a real price development as shown in Figure 5, since the 1980’s and there may lay some truth in this expectation. In the end however, the market will sometime get saturated and real prices won’t continue to grow. If people have purchased housing at higher prices than this equilibrium price, then as a result of a stagnated market, they have made a loss. (Segerborg & Ahlgren, 2010)

2.10 The mortgage market
Approximately two thirds of the Swedish population live in houses and apartments where the mortgage ratio lies higher than 85% of the value for the property (Finansinspektionen, 2013). The mortgage markets is therefore a significant parameter for the real price development on the housing market as it defines how much money that a household can purchase property for. The mortgage market is somewhat regulated in Sweden and the cost per mortgage may vary depending on income and the location of the property among others.

To be able to buy a mortgage one needs to set up some ground rules. The Swedish institution of finance has decided that the mortgage receiver needs to come up with a cash contribution of 15% of the total mortgage value. The mortgage institution offers different time periods to fix the interest rates and you also need to sign an amortization plan for how long you aim to have the money loaned. (Finansinspektionen, 2013)

The housing market is mainly based on loaned money. The interest rates and amortization requirements are therefore crucial variables that would affect the price development. These secularities makes the market even more complex and therefore
more interesting to investigate to see how different values affect the prices and in the end how one should think when investing in real estate.

The amount of cash contribution towards mortgages is discussed by the Swedish central bank. If you increase the capital per lending ratio than that effects the price development on the market as people have harder times to come up with increased capital. This regulation can be used in order to cool of a heated housing market (Sveriges Riksbank, 2014).
3. Data and variables
This part described the variables used to analyze the price development on the Swedish housing market.

3.1 Price index
Price index is the dependent variable for the thesis. The variable is a measure of the price development on the Swedish housing market. Valueguard Corporation has supplied this paper with index values for the price development for all properties sold each month/3-month/6-month in each municipality between the years 2005-2013. The supplied data also incorporates a dummy-variable for apartments or houses as well as an average square meter variable. The index value starts with the index base number of 100 for each municipality. The value incorporates the average price index for all apartments/houses that our sold for each municipality during the observed years. To perform an annual index we have used a moving average number for each year. The index value increases in percentage units. This variable is named index in our regressions (Valueguard, 2014).

3.2 Square meter price
Valueguard Corporation gathered the inflation adjusted average square price for all housing sold in each municipality at our starting year 2005. The variable is used to adjust for price changes depending on the size of an apartment. Price and demand correlation implies a decreasing willingness to pay for larger quantities (in this analyze, more square meters). This variable is included to adjust the price development depending on size. The index variable is multiplied by the average square meter price for Sweden during the observed years. This yields the real price development for housing in each respective municipality. The variable is transformed, as a percentage price increase doesn’t reveal the real price change.

For investors in houses and apartments, the percentage increase is the most interesting variable but to analyze the effects of other parameters and the real price development as a whole, this variable need to be incorporated. Some municipalities starts with lower starting prices than others, the square meter price is significant to find the real price development. The variable is named sqmp in our regressions (Valueguard, 2014).

3.3 Population
The central bank of Sweden concludes that a reason for increasing housing prices is increased population (Flam, 2014). The population development is assumed to have significant impact on the housing prices. As the market increases, the demand for a fixed good tends to increase, yielding higher prices. In this case, population is defined in tens of thousands. The variable is supplied by SCB, the central agency for statistics in Sweden. The variable is named pop1 in our regressions (SCB population, 2014).

3.4 New houses
The price and demand correlation concludes that with larger available quantities, prices tend to go down. In this empirical analyze, the quantity is housing which make the supply of new houses a relevant variable to include in the model. New houses are a variable used in this model to incorporate the increased supply for apartments and houses within the model. An increase in houses is regarded as an increase in quantity
and is therefore regarded as having a negative effect on the housing price development. ([Schiller, 2007](https://www.journals.uchicago.edu/doi/abs/10.1086/510777?journalCode=brusci))

The variable is defined as finished houses for sale. This variable had not been calculated for 2013, which meant that we generated the value for 2013, by a moving average. The value is supplied by SCB. The New houses variable is named nhouse in our regressions (SCB new houses, 2014).

### 3.5 New companies

The amount of new companies is assumed to have a significant effect on the price value index as [Jane Black](https://www.journals.uchicago.edu/doi/abs/10.1086/510777) shows these affects in 1996. As new companies emerge, this often yields new employment opportunities, which increases the demand for housing, resulting in an price increase for this municipal ([Black, 1996](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)).

The Swedish institution samples the amount of new companies created for corporations. The variable is defined in amounts of companies started. The variable is named ncomp in our regressions ([Bolagsverket, 2014](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)).

### 3.5 Foreign background

The amount of people coming from a foreign background is assumed to have a significant effect on the price index variable as shown by [Albert Saiz](https://www.journals.uchicago.edu/doi/abs/10.1086/510777) in 2007. Saiz shows a positive correlation between an increases of immigrants ante the development in housing prices in the US ([Saiz, 2007](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)).

The foreign background is later used as an instrument for the population growth variable. This variable could partly explains the population gross in a municipally and is therefore used as an instrument variable for population grows. The variable is supplied by SCB and defined in per cent units, which was multiplied by the population variable and transformed into real amount of people. The variable is named fback1 in our regressions. ([SCB population, 2014](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)).

### 3.6 Foreign born

The same assumptions are drawn as for the variable foreign background ([Saiz, 2007](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)). The differences are that in the foreign background variable, one could be included when being born in Sweden by parents born in another country. This variable could partly explains the population gross in a municipally and is therefore used as an instrument variable for population grows. The foreign born variable captures only the population born outside of Sweden. The values are supplied by SCB and measured in per cent units and transformed into amount of people by multiplying by the population variable. The variable is named fborn1 in our regressions. ([SCB population, 2014](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)).

### 3.7 Unemployment rate

The unemployment rate for a certain municipality is assumed to yield negative effects on the average price index as when your unemployed you tend to have a low income yielding a low purchase of power ([Black, 1996](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)).

This variable is defined as people registries as unemployed by the institution for unemployment. The variable is defined by the amount of people unemployed. The variable is named u in our regressions. ([Arbetsförmedlingen, 2014](https://www.journals.uchicago.edu/doi/abs/10.1086/510777)).
3.8 **Amount of break-ins**
The amount of break-ins variable is used as a measurement for how safe a certain municipal is. Robert T. Greenbaum derives that there is a negative correlation between crimes and the housing price development which could imply significant negative effects on the price index value. Greenbaum shows that the effects of crimes are larger depending on the average wealth-level within a district (Greenbaum, 2006).

The amount of break-ins is defined by its natural value and supplied by the Swedish national council for crime prevention, BRÅ. The variable is named burg in our regressions. (BRÅ, 2014)

3.9 **Total amount of crimes**
The total amount of crimes variable is incorporated in the model by the same reasoning as the break-in variable. It is assumed to be a variable that incorporates the safety-level of a municipal and an increase in crimes tends to decrease the development rate for housing (Greenbaum, 2006).

The variable is defined by its natural number and supplied by the national council for crime prevention, BRÅ. The variable is named crimes in our regression. (BRÅ, 2014)

3.10 **Amount of jobs available**
The amount of jobs available variable is included in the model as people might move between municipals if there is a possibility of getting a job in that municipal. The increase in job availability could increase the population leading to an increased demand and a higher price index (Black, 1996).

The variable is given by its natural number and supplied by the institution of unemployment. The variable is named jobs in our regressions. (Arbetsförmedlingen, 2014)

3.11 **The interest rate**
The central banks interest rate is assumed to effect the price index variable negatively as an increased interest rates leads to that private banks increase their interest rate and the price for mortgages more expensive leading to an assumed decrease in the price index variable. The effects of the interest rate has however varied over time, showing a positive relation between increased rates and housing prices prior to 1970’s in the US. The correlation between increased interest rates and housing prices has been negative. The prior positive correlation is assumed to occur due to external factors (Harris, 1989).

The variable is supplied by the central bank of Sweden and is defined in percent units. The variable is named repo in our regressions. (Ekonomifakta, 2014)

3.12 **Average Income-level**
The average disposable income level for the municipality is included as an increase in income yields a higher purchasing power and this is assumed to increase the price index variable. Increased average mortgage payments can also be captured by disposable income level. The relationship between income level and housing prices is positive, implying that an increased level of income for a district will yield an average increase in house prices for this district (Brown, 1980)
This variable of income is inflation-adjusted and supplied by the institution for statistics in Sweden, SCB. The variable is named income in the regressions. (SCB Income, 2014)

3.13 GDP
The GDP level incorporates in what stage of the market a country currently is and this might affect the development of the price index variable. Increases in the GDP-level per country will yields an increased aggregate demand of houses and housing price has a positive shocks (Iacoviello, 2005).

This GDP-value is index adjusted with the starting value of 100 at year 2005 and supplied by the central bank of Sweden. The variable is named bnp in our regressions. (Sveriges Riksbank, 2014)

3.14 Fokus ranking
To try and incorporate as many external factors as possible this paper includes a ranking parameter that has been set by the Focus time script. The Fokus ranking variable is an instrument variable based on the Swedish time script Fokus ranking of the best municipals to live in based on 30 parameters. The parameters for which Focus bases their ranking systems are shown in Appendix 1. The municipals with the most suitable value receive ranking 1 and the least suitable receives ranking number 290. (Fokus, 2014)

The variable captures values for education quality, elderly care, and the business environment. The variable includes qualitative values of in what extent the population like their municipal and so on. These values are difficult to capture individually and has therefore been used by Fokus through market surveys and compiled into this ranking system. The Fokus magazine releases this information annually to decide which are the best municipals to live in Sweden and this paper attempts to explain the effects of their results on the real price development. Each incorporated variable is shortly defined in Appendix 1 (Fokus, 2014).
4. Method
This chapter of methods incorporates the empirical structure prior to the analysis. The data set and variables are described as well as our different empirical estimation models. The chapter also incorporates the limitations and divisions used in the empirical models. The author also discloses his initial beliefs and expectation for the estimation.

The empirical dataset used is a dynamic panel dataset. The panel dataset enables the author to view the development over time. Having the dataset dynamic makes the development adjust towards differences in for example real income levels for each municipality. To analyze this data, the author has chosen the Xtabond2-model.

The simplest form of an empirical panel regression to find a significant relationship between prices and parameters on a panel data set is to estimate a standard generalized least square straight-line estimation. The more complex and the more variables affecting the model, the more complex becomes the empirical models. (Trivedi, 2010)

There are requirements that need to be fulfilled in order for the models to be acceptable. Homoscedasticity is a Gauss-Markov requirement, meaning that the error terms need to have an expected value of 0 and a constant variance. To be able to analyze our econometric models and deal with a possible heteroscedacity, the robust command is included for the estimations in STATA. The error terms need to follow a normal distribution, which is controlled for by analyzing the Jarque-Berra test in Table 7.

Endogeneity is a problem for most estimation models as parameters may affect an explanatory variable in some ways without affecting the investigated variable directly. To deal with some endogeneity, we analyze the Hausman test and later develop our estimations by including instrumented variables.

4.1 Limitations for the model
Missing values for 62 municipalities’ yields that there are 228 municipals consisting of houses and apartments in Sweden in our panel dataset. The reason for which not all 290 municipalities are included is due to incomplete data for price development through the investigated period. We start of by adjusting the included municipalities as observations in a panel study for 9 years, 2005-2013.

Since the dataset is under a short period of time, this might have some effect on the creditability for our results. During the investigated period there has been a financial crisis, which possibly have affected many of the macro economic variables in other ways than normally. The dataset basically starts of by reaching the top of a state of the market peek and has had a declining correlation since. This negative effect could impact on the estimations.

Multicollinearity is a problem that we are dealing with constantly in estimating econometric models. Having the amount of jobs and unemployed in the same models may affect each other within the model. The same argument can be derived for the foreign people and foreign background variables (Table 2, Model II).

We conclude that an estimated regressor is significant at a 5% significance level.
4.2 Division
As Flam described in the article from 2014, a share of why housing increases could be that people are moving in to larger cities (Flam, 2014). To analyze if this conclusion by the Swedish central bank is relevant, or if there are any differences between municipally sizes, the dataset is divided into 3 groups. The observations are divided into three different groups’ small, medium and large municipals. Small municipals are defined as smastad and include municipals with a starting population of less than 20 thousand inhabitants, yielding 123 municipalities. Large municipals are the 22 municipalities having a population greater than 70 thousand and called “storstad”. Medium sized municipals are the 83 in-between referred to as “medelstad” in our results.

4.3 Models
4.3.1 Xtabond2-model
There are different methods for analyzing the relationship between the real price increase affects by the “quality of living” variable. Since this dataset includes a large sample of observations during a relatively short period of time. This paper uses the Arellano-Bond Xtabond2-model.

The Xtabond2-model is a developed model based on a difference and systemized generalized method of moment’s model, GMM. The model is developed to yield regressions and estimations on dynamic panel estimators based on cross sectional time series data. (Roodman, 2009)

The model is able to fit two closely related dynamic panel-data model. The first is the Arellano-Bond model from 1991. The difference from the Arellano-Bond model is that the Xtabond2-model uses a two-step standard error correction, which will be described later on. The Arellano-bond model is sometimes referred to as the difference GMM model while this second, augmented version is refer to as the system GMM-model.

The model estimators are designed for a dynamic small time period dataset with a large population size that may or may not contain fixed effects. This model separate from these fixed effects, idiosyncratic errors that are heteroscedastic and correlated within but not across observed individuals.

$$Y_{it} = \beta_1 x_{it} + \beta_2 w_{it} + \mu_{it}, \mu_{it} = \varepsilon_{it} + \upsilon_i$$

Equation 1

The independent variable in the model, $x_{it}$, is a vector of strictly exogenous covariates that are ones dependent on neither of the current nor by past error terms. The $w_{it}$ variable is a vector of predetermined covariates, all of which may include a lagging effect on our dependent variable $Y_{it}$. Endogenous variables and covariates are all of which somewhat correlated with the part error term $\upsilon_i$. $\upsilon_i$ is a term that captures the individual effects and how these are potentially correlated with previous and current error terms.

The model uses a first-differentiation to remove the captured $\upsilon_i$ and hence eliminate potential sources of omitted variable bias in out estimations. Differencing the variables that are predetermined but doesn’t need to be strictly exogenous makes them endogenous in the model.
The model is a combined development of the Holtz-Eakin, Rosen and New model from 1988 as well as the Arello-Bond model from 1991. These GMM-model estimators state that instruments in the differenced variables are not strictly exogenous as of their abilities to capture lagged effects. This differs from strictly exogenous instruments were they’re assumed to be strictly uncorrelated with no past or current errors.

The original Arello-Bond model contained a problem with lagged levels of poor instruments when applying the first-differentiation. If the variables acted according to a random walk, meaning that they were impossible to forecast. The original equations can be added as instrumented lagged levels within the model to increase the models efficiency. In the Xtabond2-model, variables are instrumented with a suitable amount of lagged periods that is best applicable for the model. To be able to perform these transformations, one has to assume that the differences between municipals in this case are uncorrelated unobserved fixed effects. The xtabond2 model implements both first difference estimators as well as orthogonal estimations.

Another development in the Xtabond2 version is the introduction of the Mata version that includes orthogonal deviation transformations instead of taking the first difference as before. The difference is that the orthogonal deviation transformation subtracts the previous average of an observation instead of subtracting the first difference. This smoothens out forecasts and also removes the fixed effects within the model. As lagged observed variables don’t enter the transformed model, they continue to stay orthogonal to the transformed error terms, implying that there shouldn’t be any serial correlation for the instruments.

Taking the orthogonal transformation instead of first differentiating doesn’t affect the amount of reduced time periods for the model. For instrumented variables, \( w, wi(t-1) \), are transformed as observations at time period \( t \) for individual \( i \). In the Xtabond2, we apply this for two time lags.

Generalized method-of-moment, GMM estimations need balanced panel sets to perform a two time lag generally generate numerically identical coefficient estimations meaning that the instrument set are kept fixed. The orthogonal deviation structure however, able you to keep a larger sample size including missing values. The reason for this is the orthogonal transformation, which generates the average change from the previous observation for your missing value. This makes the model able to work with larger incomplete data sets while the previous first differentiation models had to drop these observations.

The xtabond2 model is also an instrumented regression model, making it possible to include correlated parameters effects on variables that are believed to yield significant effects on our dependent variable.

The Arello-Bond estimation model deals with time-invariant county characteristics, fixed effects. These effects could be correlated to the explanatory variables in our model. The fixed effects are reflected in the error terms for the estimation and are due to unobserved parameters that affect our dependent variable. (Roodman, 2009)
4.3.2 Correlation
In econometric models there is nearly always a problem of endogeneity, meaning that explanatory variables are affecting each other within an estimated model. To remove this unwanted effect one can use one of these variables as an instrument when building an econometric model. To see which variables are correlated with each other, one performs a correlation matrix in STATA (Baltagi, 2008).

The Pearson’s product-moment correlation coefficient is used for each observation to calculate the casual relationship within our model.

The correlation value lies between -1 and 1 where the extreme values imply highly correlation and as the value moves towards 0 implies uncorrelated variables.

The correlation matrix is used in the model to see how variables develop according to other variables. If there is a high correlation between variables, than they act similar to each other.

4.3.3 Fixed and random effect
In a panel regression dataset when sampling observations under a specific time period there usually is a staring difference between the observations. These differences are used in terms of random or fixed effects. The term is used to describe differences in our intercept and development between individuals, municipals in our case. (Baltagi, 2008)

The fixed effect concept states that the differences between observations is caught by the intercept and is constant over time. Taking the first difference of such a model deletes the problem of fixed effects.

A random effect model states that the differences between municipalities in our case are random over time. The random effect concept tells us that there is some unobserved difference between municipals that affects the observations differently.

To find which model is best suitable to estimate Durbin, Wu and Hausman developed the Hausman test. The Hausman test is a chi2-test that of two estimated models error terms. The Hausman test can test for endogeneity and also if there if a random or fixed effect model is more suitable when estimating our regressor’s for a panel data set. When testing for random or fixed effect models, the null hypothesis is that there is a random effect within the model. (Greene, 2008)

4.5 Empirical expectations
My expectations of the empirical estimations are that the price variable will be negatively affected by an increased interest rate. Interest rates yield more expensive mortgages and, hence a reduced property budget yielding decreased prices.

The population growth affects the demand function, as more people desire a fixed supply of housing yielding increased prices. Immigration from people from other countries or people with a foreign background can however yield negative effects on the price development. The reasoning behind this expectation is that people coming fleeing from other countries has a lower average income reflecting in a multi collinear effect of having a negative effect.
Increased lagged income should reflect positively on the price development as people basically afford to spend more on housing. The amount of jobs and companies started should yield an attraction from unemployed, yielding an increased demand and higher prices. An estimation parameter for unemployed however is believed to effect the price development negatively.

The amount of burglaries and crimes in a society is expected to yield negative effects on the prices, as people want to leave in safe places where you don’t get robbed, at least I do.

Lagged GDP levels should also reflect positively as an increased GDP level tends to increase the standard of living and the real income, yielding increased price levels. Systematically lagging the dependent variable is something that the author believes will have a positive sign to explain the phenomena of the exponential price development.

The parameter estimation for the perceived “quality of living” variable will probably gender a negative sign. Having a good quality of living in a municipally yields a low value for the Fokus variable.
5. Results
This chapter captures the empirical results from the estimated models. The regression results referred to in text form and showed in Appendix 2.

5.1 The Hausman test
Table 1, Model I&II are results from two generalized least square regressions with adjustments for random respectively fixed effects. Table 2, Model I is the results of a Hausman test that concludes that the observations seem to include a fixed effect difference.

5.2 The Xtabond2 model
The results from the Arellano-Bond Xtabond2 models are shown in Tables 5, 6.

From the results in Table 5, Model III we read that the population growth and the Fokus ranking variable are the only significant variables that effect the index variation. Both affect the dependent variable negatively.

The population growth and the focus ranking variables have significant effects on the square meter price development.
6. Analysis
This chapter analyzes the results from chapter 4, interpreting the results and comparing them against economic theories. The author also includes some personal opinions from the results.

6.1 The Arello-Bond model
The reduced Arello-Bond Xtabond2 model, Table 6, Model I shows that there are a negative correlation between the Fokus Ranking variable and the real house price development. The model also yields a significant positive relationship between population growth and the previous price development on the market. After eliminating insignificant parameters to the Xtabond2-model, the derived model can be shown as Equation 2.

\[
sqmp = \beta_0 + \beta_1 sqmp_{t-1} + \beta_2 popl - \beta_3 focus
\]

Equation 2

We are analyzing a short time period of observations with a significant fixed effect within our sample. This sets up the right conditions for applying the orthogonal deviating Xtabond2 model. The results from this Xtabond2 model yields that the Fokus ranking has a significant effect on the price development for the municipals in Sweden. Having a well-respected education, quality elderly care and a healthy environment in the municipals yields low values for the Fokus ranking. Increased Fokus ranking values significantly inhibits the price index to grow, Table 6, Model I. The population growth and interest rate also effect the index development negatively Table 5, Model II & Table 6, Model I.

Table 6, Model I also shows that the population growth increases the price per square meter, which seems reasonable as the demand increases and the estimated parameter for the “quality of living” variable is negative which is consistent towards economic theory.
7. Discussion
The real price increase of property leads to that the population in Sweden are less able to purchase other goods than in a stable market. Looking at the development for housing prices over the past years, one can easily see that it has been growing exponentially. This has led to a psychological effect property is always a good investment. And it truly seems to be, even the deep crash in the real estate market in Sweden during the 1990s only took 7 years to recover from, and to be in the same real price level as. In fact, prices have grown by 250% since the recovery in 1997. This implies that there is no really short-term reason for why the real estate markets price development should stagnate. It should therefore be regarded as an attractive but ineffective economic market for investments. Even though adjustments in variables as interest rate, the GDP-level income level and unemployment level might push down prices significantly, this doesn’t reflect the price changes in the market.

The main belief that, the price development was centralized towards the largest municipalities showed to be completely inaccurate. Instead, the advice for investment possibilities towards real estate agents and mortgage institutions would be to invest in municipals as Mjölby, Motala and Hudiksvall where the return on equity has increased by nearly 500% during the past 8 years. (Valueguard, 2014)

For the Swedish society the increased lending ratio and the increase income spent on housing is both a short and long term threat. History tells us that even though the real values for housing continues to increase, there have been a couple of speed bumps on the way. As the debt ratio has increased even more than the development prior the 1990s real estate crisis, this is truly worrying. As I discussed previously in this paper, 1990s crash wasn’t really a case of a bubble bursting but merely a ventilation release for a bubble growing too fast.

The empirical evidence gathered by the statistical institution agency in Sweden clearly shows us that the price and lending increase has sprung up to the 1990s rate and past. Of course other parameters than the price development and lending similarity affected that there was a crash in the 1990s, Figure 8. The central banks unconsidered move of a shock increased interest rate was a major factor and something that the Swedish monetary agencies have learned from, probably. There is however other similarities as both situations came of another economic crisis.

The economic problem for Sweden is not only if there is a bubble about to burst or not, the problem is that the Swedish population are lending more money than they are able to pay back based on a phenomenon that real housing prices will continue to grow. This statement can’t occur. Even though the Swedish population has had a real income increase for many years, the lending and property prices are growing faster leading the proportions of how much capital spent on housing to shift. There must come a breakage point where the market is stagnating as people can’t spend all of their money on housing, other factors are clearly significant as well. Therefore, weather the stagnation will come in 1 year, 5 years or 50 years doesn’t matter. When the stagnation occurs, the Swedish society will have a debt ratio that can’t be paid back to the private banks. This could lead to a domino effect where the Swedish society collapses. However, my personal belief is that reality doesn’t need to be as dark as I just formulated. There are adjustments that can be made that could stabilize this market.
Amortization requirements. This adjustment is currently in the making by the large private banks in Sweden. The amortizing rate has increased to 57% percent of the mortgage population. This is an increase of 47% since 2011 and this increase is a necessary requirement to stabilize this price development (Finansinspektionen, 2013). However, the average amortizing ratio is still on 148 years. Imposing that customers are basically able to borrow money without having a realistic way of paying them back. This phenomenon has occurred based on that the property value always will continue to grow. Increasing and shortening the length of a mortgage able people to afford lower loans as their monthly income takes a harder hit by the amortization requirement. This could cool down the economic climate on the market without having a market failure. The problem is that market doesn’t only move according to economic adjustment, it moves also according to expectations. If the population of Sweden believes that the monthly costs for housing will increase, than the market value will decrease then we have only pushed the crash forward. I believe that a crash is inevitable, as the income-lending ratio can’t continue. It could therefore be smart to push the hit towards us no before the lending ratio increases even further. This would stop the price development and the market could stagnate.

A problem with increasing the amortization requirements is that people could seek mortgages from other countries, leading to that the Swedish monetary capital gets pushed overseas. It could also mean that the property would only be bought by people having old money or by foreign money. This doesn’t necessarily mean a bad thing.

7.1 Why suppliers doesn’t produce more housing
The amount of new houses and apartments didn’t yield significant effects in our regression but we still believe that the parameter is important. The supply and demand relationship is a cornerstone in economic theory and it would be highly surprisingly if the supply didn’t affect the demand. The problem is probably that the variation in newly produced property doesn’t vary enough within municipals. A reason for this is a highly regulated market that makes it difficult for the construction companies to fulfil the demand. If this market should be more open and deregulated then perhaps more apartments could be built. Look at Stockholm city for example, we find highly priced apartments and a high demand. This should attract construction companies to exploit the city. However, regulations are such that the capital city design shouldn’t be changed as much. Construction companies are not able to build higher houses that could contain more apartments due to these regulations. This increases the risk for construction companies, as people are demanding apartments in the central part of town and not outside where they are able to build them. Should the market deregulate this than we would probably see significant effects on the amount of houses produced. (Villaägarna, 2013), (Boverket, 2012)

7.2 Fokus ranking
The focus ranking parameter has shown significant effects on the price development in straight-line GLS, Instrumented GMM, and autoregressive regression estimation. This effect states that soft society values have important effects on the housing market. People incorporate qualitative parameter into their valuation and this effects the price development.
8. Conclusion and suggestions

Empirical results show that the Swedish society in general is spending more and more of their net income on housing costs. Historical so-called real estate crashes have led to short time price drops but the market continues to recover and keep growing in real prices.

Systematically including lagged parameters for the dependent variable result in a significant positive estimation regressor. This estimator includes some of the phenomena of prices tending to increase, as they’ve always tended to increase. Including the instrumented Fokus ranking variable shows significant parameters, which incorporates some of the complexity on the market. The real estate market can’t be analyzed as a simple goods market since there are many alternative costs effecting why the prices tend to increase. Purchasing real estate in a trending, upwards moving municipal on the Fokus ranking will increase the value of the property in the future, making the purchase an investment asset. The Fokus and the lagging dependent variable capture some of the unknown effects of such as quality of living and future prospects. Having the significant effect of a positive effect by the lagged changes explains some of the psychological effects on the price and index variation. The Swedish financial supervisory authority states that this psychological change might have made the housing market to become overvalued by up to 20%.

A GLS estimation of the differences between municipal sizes concludes that smaller municipals are affected by amount of people with a foreign background, new companies entering the municipal, and interest rate changes. Increasing the local foreign background population or interest rate decreases the real housing prices whilst a company entering yields a positive effect on the price level. Prices in medium and large municipals are significantly affected by the interest rates negatively and GDP level positively. Their empirical significance concluded that investors in real estate should Fokus their investments within the low 25-50% population municipals in order to generate the highest percentage increase of their real estate investments.

The Arello-Bond Xtabond2 model removes the fixed and endogenous problems reduce the model to being significantly affected by the Fokus ranking system, interest rates and the population growth. This model is believed to be the most suitable model to analyze the Swedish housing market as it mixes the advantages shown by the other three estimations. This yields that to effect the price development, the government should temper with the population growth, the “quality of living” variable and the interest rate. The Fokus ranking system and the population growth is very complex to deal with but the interest rate however is directly set by the central government. Setting a higher interest rate today could reduce the lending development and cool of the market in the short run.

The real price increase development enables to private consumption to spend relatively less of their income on other consumption goods. If this phenomenon would continue, the real consumption level would have to decline. This would affect the Swedish GDP development and is therefore a problem that has to be dealt with by the Swedish government. Increasing the costs for mortgages would generate a price drop or stabilization, as people aren’t able to borrow as much money. This would reduce the market risk for future interest rate changes cooling down an exponentially price
growing market. The mortgage cost structure should then slowly be moved towards a bit lower interest rates at higher amortizing rates, keeping the cost for mortgages higher than the current whilst stagnating the price development.

The real price development on the market will stagnate sometime in the future as real prices can’t reach total real income. If the society are lending money for overvalued estates, than a stagnation will yield into a deep recession as nearly 2 thirds of the market population would have assets that are lower than their lend money.

Neither of the empirical result concludes that the supply of new housing property effects the price development, which is quite contradictory towards the price and demand theory. The reason for this unexpected insignificance believes to be the constant variation for the variable. Here lies the actual problem according to me. If there would be an unsaturated supply for housing, than prices wouldn’t continue to increase as much. The government should therefore deregulate this market so that construction companies can fulfil the market demand.

The results of the derived model shows that increased quality of living within a municipality compared to other municipalities in Sweden yields an increased price development compared to these municipalities. This implies that you can find a possibility of investing in municipalities that are increasing in ranking of the quality of living by Fokus magazine to increase the expected rate of return of your investment in the housing market.

8.1 Future research
Investigating the social and economic effects of the million housing programs effects on the Swedish society would be an interesting subject. We see rapports of increased segregation in our society. As more immigrants and refugees seem to move into these project districts, it would be interesting to see how the increased segregation in Sweden has been effected.

Investigation if there is any causal correlation between the foreign backgrounds parameters’ effects on the price development compared to the increasing support of xenophobic political party “Sverigedemokraterna” would be interesting to investigate.
9. Reference


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Valueguard 2014, Valueguard AB supplied data of the price index development of all houses during the investigated period.

10. Appendix 1

10.1 The “quality of living” variable ranking system

- Amount of youth that has reached the knowledge goals in school. The measurement regards the schools students, including foreign born, parents education level in this variable. The higher relative amount that’s reached the goals, the lower number on the ranking. (Skolverket)
- Amount of teacher per students, increased amount yields a lower number on the ranking. (Skolverket)
- Amount of sport clubs, increased amount yields a lower number on the ranking. (Riksidrottsförbundet)
- Psychological health among youths, increased health yields a lower ranking. (Folkhälsoinstitutet)
- How well the population like their current municipal, has a positive effect when evaluation the municipal. (Fokus)
- Average age. (SCB, Statistiska Centralbyrån)
- Youths unemployment, increased unemployment yields a higher ranking number. (Arbetsförmedlingen, månadsstatistik)
- Bullying, increased rate of bulling yields a higher Fokus ranking. (Folkhälsoinstitutet)
- Usage of Alcohol and Tobacco, increased amount reflects as high number in the Fokus ranking. (Folkhälsoinstitutet)
- Elderly Care, cost for elderly care for people over 65 effects the Fokus ranking system positively. (SCB, Statistiska Centralbyrån)
- Availability on the elderly care, increased availability has a positive affect on the ranking variable. (Socialstyrelsen)
- Quality in the elderly care, increased quality yields a lower number on the Fokus ranking. (Socialstyrelsen)
- Personal per elderly in the elderly care has a positive affect on the ranking. (Socialstyrelsen)
- Average life expectancy, supplied by SCB and has a positive effect on the ranking. (SCB, Statistiska Centralbyrån)
- Pension level, increased pension levels yield a positive affect on the parameter. (SCB, Statistiska Centralbyrån)
- Amount of people affording to purchase a house, increased rate affects the Fokus Ranking. (Villaägarnas Riksförbund)
- Parental leave for father’s, increased value has a positive effect on the evaluation by Fokus. (TCO, pappaindex)
- Personal per child in the kinder garden, increased rate yields a lower ranking. (Skolverket)
- Mount of people with an absence of leave from jobs due to sickness and poor health. This variable has a negative affect when ranking the municipals. (Folkhälsoinstitutet)
- Income differences between men and women have a negative effect on the ranking parameter. (SCB, Statistiska Centralbyrån)
- Unemployment, increased unemployment rate increases the ranking variable number. (Arbetsförmedlingen)
- Change in unemployment, a positive change has a positive effect on the ranking system. (Arbetsförmedlingen)
- Education level, increased level has a positive effect on the ranking system. (Skolverket)
- Amount of work related accidents, increases the number of the “quality of living” variable. (Folkhälsoinstitutet)
- Business Environment, A healthy environment has a positive effect on the ranking evaluation. (Svenskt Näringsliv)
- Amount of people commuting, increases the Fokus ranking value if high. (SCB, Statistiska Centralbyrån)
- People moving in and out from the municipal. An increased “moving in” ratio has a positive effect on the valuation of the municipal. (Statistiska Centralbyrån, SCB)
- Amount of increased population by newly born, effects the variable negatively.(Statistiska Centralbyrån, SCB)
- Taxation value for houses, increased previous value has a positive effect when valuating the municipal. (Statistiska Centralbyrån, SCB)
- Environmental protected area has a positive effect when valuating the municipal. (Metria Lantmäteriet)
- Amount of crimes committed, increased value decreases the evaluation of the municipal. (brottsförebyggande rådet, BRÅ)
- Places aloud to serve alcohol, has a positive effect a effect on the evaluation of the municipal. (Folkhälsoinstitutet)
- Amount of suicides, has a negative effect on the ranking system. (Folkhälsoinstitutet)
- Alcohol related deaths, has a negative effect on the evaluation of the municipal. (Folkhälsoinstitutet)
- People active in political turnout, has a positive effect on the ranking system by Fokus. (Statistiska Centralbyrån, SCB)
- Taxation rate, increased taxation yields a lower evaluation by Fokus. (Statistiska Centralbyrån)
- Immigration rate has a positive affect on the evaluation. (Migrationsverket)
- People supported by social services, has a negative effect on the Fokus evaluation.
- Solidity, How wealthy the municipal is has a positive effect when ranking the municipals quality. (Statistiska Centralbyrån)
- Health level, a good health rate has a positive effect on the evaluation.
- Economic assistance for developing countries per municipal capita, this has a positive affect when evaluating the municipal. (Socialstyrelsen)
- Amount of Divorces, increased amount yields a higher Fokus ranking number. (SCB, Statistiska Centralbyrån)
11. Appendix 2

Table 1 Random-effects GLS regression of Square meter price

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<tr>
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Table 2, Random-effects GLS regression of Square meter price

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<td>(0.089)</td>
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| N                              | 1962                         | 2052                         |
| Groups                         | 218                          | 228                          |
| $\chi^2$                      | 908.62                       | 868.35                       |
| p                              | 0.000                        | 0.000                        |
Table 3, Correlation matrix for the price index variable

(N=1962)

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<td>1.00</td>
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<td>6. Amount of crimes committed</td>
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<td>0.98</td>
<td>0.98</td>
<td>0.98</td>
<td>1.00</td>
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<tr>
<td>7. Amount of jobs available</td>
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<td>0.95</td>
<td>0.91</td>
<td>0.91</td>
<td>0.91</td>
<td>0.94</td>
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<td>0.98</td>
<td>0.98</td>
<td>0.97</td>
<td>0.99</td>
<td>0.92</td>
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<tr>
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<td>0.63</td>
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<td>14. Residuals</td>
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Table 4, Correlation matrix for square meter price variable

(N=1962)

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<td>14. Residuals</td>
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Table 6, One step system GMM dynamic panel data estimation for square meter price development

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Table 7, Jarque-Bera test for the models goodness of fit

Jarque-Bera test

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Table 8, Arellano-Bond dynamic panel data estimation for price index development

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