Are Housing Prices Reaching its Peak?

- A Study on the housing market in Stockholm

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Abstract

During recent years there have been many debates concerning the housing market in Sweden, and many sources claim that there may be a housing bubble. This thesis will be limited to looking at the price development of the housing market in Stockholm, as housing prices in Stockholm have increased at a faster rate than any other city in Sweden, and housing prices are by far the most expensive in the country. The aim of the thesis is twofold. The first aim is to discuss whether the housing market in Stockholm is overvalued. The second aim is to discuss whether the price development of the housing market is sustainable in the long run. By discussing and analyzing fundamental demand and supply factors (that are major driving forces behind housing price developments) the thesis provides an understanding as to why the housing prices in Stockholm have had such high growth rates; and aids in answering the aims. The findings suggest that the housing market has developed into extremely generous conditions, which has allowed for prices to naturally appreciate. Furthermore, there are factors that suggest that the housing market in Stockholm is indeed overvalued as housing prices may have exceeded the value of the underlying fundamentals. The findings also suggest that fundamental factors are likely to change in the future in a way that will contribute to reduced pressure on housing prices. In other words, it is highly unlikely that the housing market can become even more generous, or even remain at its current state, that would allow for further housing price increases. Therefore, the thesis concludes that the price development of the housing market is not sustainable in the long run.

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1. Introduction

In December 2007 a recession began, which ultimately led to the most dangerous global financial crisis since the great depression. The general consensus is that the primary cause of the financial crisis was a result of the bursting of the housing bubble in the U.S, leading to a credit crisis, which spread across the world (Holt, 2009). Since then there has been much debate concerning housing bubbles, and what can be done to mitigate future housing bubble bursts. Unfortunately there is still no exact science to detect housing bubbles, and it is generally difficult to discern whether housing prices are based on fundamental factors (and are fairly priced), or that other means have caused housing prices to inflate beyond their fundamental value; and thereby determine whether a housing boom will turn into a bust (Burnside, Eichenbaum, & Rebelo, 2011).

The housing market is considered to be an essential sector of the economy. It is a vital component of the economic growth of a country, and the consumption of housing and related expenses are major drivers of aggregate demand (Bezemer, 2013). In fact, in each economy, the biggest asset market is the market for housing and land (Bezemer, 2013). As mortgage lending constitutes a large part of banks portfolios, the value of housing assets is considered critical for financial market stability (Bezemer, 2013). A well-functioning housing market can induce labor mobility, wealth accumulation, mitigate macroeconomic volatility, and help economies adjust to adverse shocks. Even if a housing bust does not have a large impact on the financial stability, it can still lead to recessions and generate more unemployment than normal recessions (Bezemer, 2013). In short, a stable housing market is essential for the well-being of a country's economy.

1.1 Background

The Swedish housing prices have been rising during a long period and are currently rising more rapidly than ever. The housing prices reached bottom in early 1995 due to the Swedish bank and property crisis (Frisell & Yazdi, 2010). Since then, the housing prices in Sweden have experienced significantly increasing price appreciation. While many other countries saw their housing markets fall

dramatically during the financial crisis in 2008 (for instance Denmark, Ireland, Spain, United States), the Swedish housing prices dropped only slightly before continuing upwards with great speed.

The price increases have generally been larger in the bigger cities such as Stockholm, Göteborg and Malmö. These prices have increased at an alarmingly high rate the past years, which has led to much debate in newspapers and other forums. The debates are about housing prices and the concerns for a housing bubble, and debates are today hotter than ever (April 2016), where new newspaper articles are reported frequently. Since the banking crisis in Sweden, the housing prices in Stockholm have consistently increased at a faster rate than any other city in Sweden (Ekonomifakta, 2015). Therefore, if there is an eventual house bubble that goes bust in Sweden, Stockholm is likely to be hit the hardest.

Swedish institutions and authorities have conducted and ordered reports with the concern of high and rapidly rising housing prices in focus. The National Board of Housing, Building and Planning (2010) argued already in 2010 that Sweden is experiencing a housing bubble. The report points to the large increase in the prices of housing combined with large and growing household debt. On an international basis, The Economist suggested in 2010 that the Swedish housing prices were overpriced by 41.5% ("Floor to ceiling", 2010, Oct. 21). A year later, in 2011, prices started to drop slightly. This dip in prices was only temporary, and housing prices has increased significantly since then.

Finanspolitiska Rådet (The Swedish Fiscal Policy Council) invited Peter Birch Sørensen, at the University of Copenhagen, to conduct a report on the recent trends and risks in the Swedish housing market. His report was published in March 2013 and he concludes that the Swedish housing prices may be slightly overvalued (Sørensen, 2013). In December 2013, Robert Shiller, who foresaw the housing bubble in USA, was in Stockholm to collect his Nobel memorial prize in Economics, and warned that the Swedish housing prices have disconnected from their fair value. He commented the Swedish housing market in the following way: "I think there has been a change in public thinking that is driving a temporary increase in home prices", "the change in thinking of housing as an investment" and "they think there is more value here than it really is" ("Robert Shiller Warns", 2013, Dec. 9).

The discussion about a potential housing bubble has continued along with increasing housing prices and increasing household debt. On the 23rd of September 2014, the vice director of *Sveriges Riksbank* (the Swedish Central Bank) Karolina Ekholm, warned that households may be driven to indebt

themselves too largely, related to the high prices of housing. Ekholm says: “I think that, as the prices are in the center of Stockholm for instance, I believe that there are households in certain segments that may be driven to indebt themselves pretty hard”, “I think that it is worse in the larger cities”, and “It is important to do something in order to dampen this development” (“Riksbanken varnar”, 2014, Sep. 23). Furthermore, in August 2014, the International Monetary Fund (IMF) conducted a report that the accelerating housing prices in combination with high and increasing private debt contribute to rising concern for the financial stability in Sweden (International Monetary Fund, 2014).

Even though there are many sources claiming that the housing market in Stockholm is in fact a housing bubble, there are other sources that claim this is not so. Instead, they argue that the constant increase of price is supported by fundamental factors and is thus at a fair price. The former vice director of the Swedish Central Bank, Lars E.O Svensson, said in November 2012: “All information and analysis indicates that the housing prices are supported by fundamentals. It is an extreme pressure on the housing prices in Stockholm, little new construction, people move in, many want to live in the center and so forth”, and “Then it will be understood that it is people with sufficient financial resources that can afford to buy. It is not so that people buy housing that they cannot afford to live in” (“Stockholms husägare”, 2012, Nov. 14).

In February 2010, the Swedish Central Bank requested a report that would evaluate the risks of the Swedish housing market (Swedish Central Bank, 2011). The conclusion of the report was that the high housing prices to a large degree could be explained by fundamental factors, that is to say, factors that can explain the price increase of housing. However, the report highlights that one should be careful with these kinds of judgments.

1.2 Problem

It has been several years since the first warnings concerning a housing bubble in Sweden (and Stockholm), and despite this the housing prices have continued to increase at a remarkable rate, and are today at an all-time high. Stockholm is the region within Sweden where housing prices have increased the most (and prices in nominal amounts are the highest). As housing prices have continued to increase, the debates concerning a housing bubble have become more and more common. Given

these current hot debates, we find the topic very interesting to address. However, due to the large amount of research done on whether or not Stockholm's housing market is a bubble (as shown, there are parties arguing for both sides), this thesis will not primarily attempt to answer this question as we do not believe we can contribute to new valuable insights in the matter. Instead, we intend to provide an understanding of why the housing market in Stockholm has developed to what it is today, and eventually discuss whether there is reason to believe whether the housing market may have deviated from its fundamental value.

In order to shed light on the development on Stockholm's housing prices, we intend to discuss *fundamental factors* that impact the supply and demand side for housing. In order to determine which factors are "fundamental" drivers of the housing market, and thereby choosing the factors to discuss, we will make use of secondary sources (previous publications) that have consistently argued for which factors are the most fundamental. These fundamental factors are deemed "fundamental" in that it can be applied to all housing markets around the world. In Section 2 we will provide a literature review which is the benchmark for choosing the fundamental factors that will be analyzed throughout the thesis.

1.3 Chosen Fundamental Factors

The fundamental factors we intend to analyze that are underlying to the price development of housing in Stockholm are:

- Housing prices in relation to households' disposable income
- User costs of housing
  - Development of property tax regulations
  - Expectations of future housing prices
  - Mortgage rate development including tax deductibility on interest.
- The development of the credit market and household debt
  - Household debt in relation to households' disposable income
- Demographics
- Supply of housing

- The rental market
- New construction of housing
- Existing housing stock

We have chosen these factors largely based on the literature review that will be provided in Section 2. Also, through own investigation of the housing market in Stockholm we have deemed that these are the most essential. We do not claim that these are the only factors that drive the housing prices, but limitations have been made to restrict the scope for this thesis.

1.4 Purpose

The purpose of this thesis is to shed light on the dynamics of the housing market in Stockholm, and to analyze driving forces behind the price development (i.e. analyze fundamental factors that impact the demand and supply side of housing and thus drive the price development of the housing market in Stockholm). Furthermore we intend to discuss the current situation in Stockholm as a consequence of the fundamental factors, and why the situation may be precarious.

1.5 Research Questions:

To further develop the purpose of this thesis, we will attempt to answer two research questions:

1. **Is the housing market in Stockholm overvalued?**
2. **Is the price development of the housing market in Stockholm sustainable in the long run?**

1.6 For Whom would this Thesis be Interesting?

We hope that this thesis is of interest to a variety of individuals, regulators, banks and institutions. Tsatsaronis & Zhu (2004) have argued that an understanding of how housing prices behave is of crucial importance to central banks as their role is to not only maintain price stability, but also to strive for financial stability. Furthermore, as banks are providing financing to housing buyers that continually buy homes for higher prices, banks may find this thesis interesting. Above all, we believe

that individuals that are interested in purchasing a home in Stockholm may find this thesis valuable, as well as those that are interested in the Swedish (and in particular Stockholm) housing market in general.

1.7 Limitations

The thesis has various limitations that need to be reflected. The study is limited to Stockholm (inner and outer regions) in Sweden, where the housing prices have increased significantly over the last two decades. The housing market will be investigating both houses and tenant-owned apartments. The timespan of housing prices that we will investigate is between year 1986-present. Furthermore, we will primarily be looking at the market from potential buyers and homeowner's perspectives, and therefore there will be less focus on the effects of the housing market for banks and credit institutions. Consequently, when we refer to "homeowners" throughout the thesis we refer to them as either an owner of a house or an apartment. When referring to the "housing market" we include both houses and apartments.

Data is scarce on the micro-level, and we are not able to acquire numbers to make statistical regressions. However, since there already are numerous studies both arguing for and against a housing bubble, we do not find any additional value by making a similar study using regressions. Also, any error in numbers (or lack of) that are used can alter the results vastly. What we are aiming for is to create an *understanding* for anybody reading this thesis by discussing the factors, so that vast knowledge about economic terms and statistics is not required for the reader.

The current housing market is a *combination* of several factors and it is therefore difficult to determine to what extent *each* factor affects the housing market as a whole. We can determine that a certain factor affects "more" or "less", but not give it any concrete answer to its effect in term of ratings or numbers.

1.8 Critique on Literature

A majority of the literature on housing booms has been written about the U.S market, and may therefore be bias toward U.S market characteristics. Although factors that are considered

"fundamental" are similar across all countries, some factors may be more or less local and have different varieties of impact depending on the country's situation. There have been several studies made for the Swedish housing market as well; however these studies are on a national level, and thereby use aggregate data for the entire country. They do not cover data across different regions of Sweden, and do therefore not account for eventual differences across regions within the country.

Analyzing fundamental factors is not entirely straight forward as various factors that potentially affect the housing price development may be left out, as they may not be considered as "fundamental". An apparent issue with a quantitative analysis is that the offered results depend on the factors that have been used in the model, and thereby miss other potentially important factor. This raises the question of how to analyze a housing market based on fundamentals. It has historically been proven difficult to point out the sufficient set of fundamentals behind a real housing development, and to what extent changes in fundamentals can explain housing prices; especially since any housing market is local in character. For instance, Case (1986) analyzed the housing price development in Boston (U.S), and found that (based on the fundamental factors that had been quantitatively analyzed) the real housing prices should have increased by 15% between years 1983 to 1988. In reality, prices increased by 140% during this period.

1.9 Critique on Measures

Aggregated data of debt levels is limited in its ability to generate definite conclusions, and data of debt on individual level does not exist. We believe that it is more important to know how big part of the households that have "too much debt". Moreover, average disposable income level does not say much. We are reluctant to the use of aggregated data as some people may be extremely rich while others may lack financial resources. For instance, using an average of monthly income, without accounting for potential wealth or lack of wealth people have may make results deviate from reality. Those few percentages that have very high levels of income will skew average levels upward. Therefore, in some cases we believe making use of median values gives a more realistic picture.

1.10 Lack of Data

Data for price development of apartments is not available before 2005. There is no data on individuals' wealth after 2007 when the wealth taxation was abolished. Mortgage rates are not available for from all financial institutions that provide mortgage loans for the timespan that we wish to investigate, so we will make use of the mortgage loans from one of the largest banks in Sweden. We recognize that the mortgage rates from other financial institutions may differ slightly. Furthermore, there is only aggregated data on debt. Aggregated data of debt is not very useful as debt varies among individuals. Also, it is difficult to find data specific to Stockholm as most data is made on a national level.

The homeowners may have differences in wealth and amounts of debt that may impact how likely they are to be affected by ups and downs in the housing market. A significant drawback is that there is no data available of households' assets. Such information would be of benefit when one studies the housing market in Stockholm and provide the study with additional aspects.

In some cases, data is lacking for the timespan that we wish to investigate (may only be available for a limited number of years). To fill in these gaps, we will sometimes have to make certain assumptions to account for the missing data. Naturally, we will base these assumptions on rational and logical reasoning.

1.11 Agenda

Section 2 will provide a literature review on previous studies that have been done across several housing markets. Thereby, factors that are fundamental drivers for housing market developments will be discussed. This becomes the foundation for the fundamental factors that we discuss throughout the thesis. Finally a broad overview will be provided for the literature concerning the housing bubble that burst in the United States (that later instigated the global financial crisis).

Section 3 will discuss the development of housing prices in Stockholm, in comparison to Sweden, since 1986. Inflation-adjusted prices for both apartments and houses will be provided. The data will

show tremendous growth of real housing prices the last 20 years. The data on the price development of housing prices becomes the foundation for analyzing our fundamental factors throughout the thesis.

Section 4 will discuss how the housing prices have moved in relation to disposable income in Stockholm. This provides an "affordability" measure of the households' wealth in relation to housing prices. It also serves as an indicator as to whether housing prices are fairly priced or too high (too low).

Section 5 will discuss three fundamental factors in detail that are components of the user cost of housing for a homeowner (See Section 2.4.1 for a definition of user cost of housing). These factors are: Regulatory environment (taxes), Expectations on future housing prices, and Mortgage rates. At the end of the section we will combine the three factors mentioned to illustrate a simplified user cost model.

Section 6 will discuss the development of the Credit Market in Sweden. This will provide an overall picture of how the credit market is constructed (borrowing practices and regulations, and mortgage contract regulations) and how borrowing has developed over time. We will also be looking at the development of mortgage debt in relation to disposable income.

Section 7 will discuss the impact the demographic has had in Stockholm. We will show the population growth over time, as well as define the different categories of the demographic that contribute to the population growth. Different categories may have different impact on the aggregate demand of housing.

Section 8 will discuss the supply side of the housing markets. We will separate the supply market into three distinct categories: The rental market, the market for new supply (construction), and the supply within the existing housing stock.

Section 9 will consist of summaries of sections 3-8, which will provide a broad summary of the fundamental factors that have been discussed throughout the thesis. Thereafter we will analyze the factors and discuss potential future scenarios that may occur (changes in the fundamental factors)

Section 10 will conclude the thesis by answering the two primary research questions.

2. Literature Review

The literature review will provide an overview of the nature of the housing market and discuss which factors are "fundamental" in contributing to the demand and supply of the housing market, which ultimately sets the housing prices. The literature review will be divided into different sections. The first section will discuss the trend of housing markets and show that housing prices moves in long cycles of booms and busts. The second section will classify the nature and characteristic of housing. The third section will dive into previous literature about demand and supply factors that are considered fundamental drivers for housing markets. The fourth section will introduce measures for evaluating housing prices which determine whether prices are fair or overvalued (undervalued). The fifth and final section will briefly review literature done on the housing bubble in the United States and the reasons for its collapse.

2.1 Housing Market Trends

Housing markets have, in all international markets, had a long-term increasing trend of housing prices over the last 40 years. According to Englund (2011), the main underlying reasons for this seem to be related to urbanization, population growth, and increasing income levels. Across country studies, a more densely populated area have had housing prices increased at a faster pace than sparsely populated areas. Therefore, Englund (2011) argues that the availability of land as a component of housing prices has tremendous effect.

Although the long-term price trend has been increasing, housing markets move in long-term cycles as there have consistently been booms (crests) and busts (troughs) (Englund, 2011). Agnello & Schuknecht (2009) identify boom and bust phases in the housing market for 18 industrialized countries between years 1971-2007. The study clearly illustrates that real housing prices in all these countries have experienced boom and bust periods. The study was published in 2009 and showed that Swedish housing prices were in a boom from 1997 to 2007 that lasted for 11 years. According to Agnello & Schuknecht (2009) were the housing prices in Sweden above the overall trend by 67% in 2009.

Due to the cyclicality of the housing prices have booms historically been followed by busts. Furthermore, Agnello & Schuknecht (2009) find that there is a strong correlation between the magnitude of a boom and the following busts. In other words, the higher and longer the real prices of housing have increased, the larger is the subsequent fall.

2.2 The Nature of Housing

Owning a home is like owning an asset in various ways, as home ownership can generate income or losses in terms of capital gains or capital losses (Englund, 2011). Accordingly, the price of housing can be seen as the asset price (Goodhart & Hofmann, 2008). In this regard, the price of the asset can be determined by the expected returns on the asset and the discount rate (Englund, 2011). At the same time, an owner of a home may choose to rent the home to a renter. Thus, the renter pays rent to the owner for the right to live in the home. As a renter, the home is therefore a consumer good instead of an asset, since they only pay for the right to live in the home without owning the asset. So, it is important to distinguish that the costs for the service of housing (rental market) and the price of the asset itself (ownership), into two separate markets (Englund, 2011).

The price of the asset may increase if one expects a higher return on the asset or due to a lowered discount rate (Goodhart & Hofmann, 2008). In housing markets where the housing prices have increased rapidly, the expected return on the asset may be particularly important for the price determination as argued by Case (1986), and Case & Shiller (2003). With regards to discount rate, a lower discount rate increases the asset price (Goodhart & Hofmann, 2008). In other words, the price the market is willing to pay depends on the rate of return that a homebuyer requires on her investment (or the cost of funding the home investment) (Englund, 2011). These costs are the capital costs as well as costs to operate or maintain the home - also known as the user cost of housing. We will look closer at user cost of housing in Section: 2.4.1 of the literature review.

When housing prices increase, the current homeowners perceive increased wealth as their assets increase in value. Increases in assets such as housing are also shown to increase the collateral value homeowners have. According to the life-cycle model of household consumption, can the increased asset prices thus lead to more borrowing and increased consumption (Goodhart & Hofmann, 2008).

This may occur because of increased perceived wealth but also due to improved collateral values. When the housing prices increase, the higher housing prices may not only encourage current homeowners to consume and borrow more but higher housing prices also facilitate them to do so as they improve their capacity of borrowing through improved collateral values (Goodhart & Hofmann, 2008).

Despite increasing housing prices, some authors have shown that increasing asset prices can boost the demand for the assets further. The increased demand for the asset has in general been suggested to be largely driven by the expectations on further asset price increases. Shiller (2008) has pointed to various potential explanations of this, mostly pointing to psychological factors that impact people in terms of speculation and herd behavior. Because of future expectations being a significant determinant of the asset price, the market cannot reach a natural equilibrium; as higher prices do not naturally indicate a lowering of demand, but instead is dependent on the future price development. Therefore, it is difficult to determine the fair value of a home (Bezemer, 2013). Booms and busts in housing markets is a natural consequence of the future expectations that Shiller (2008) pointed out. During good times, when future prices are expected to increase, people are more willing to buy which accelerates the boom. During bad times, when future prices are expected to decrease, people become less willing to buy which accelerates the bust (Bezemer, 2013).

2.3 Underlying Demand and Supply Factors

As in any other market are housing prices determined by the interaction of demand and supply (Case, 1986). Some factors impact the demand for housing and other factors impact the supply of housing. We will be reviewing the literature of underlying fundamental factors that impact the demand and supply for housing within a country separately.

2.3.1 Demand Factors

The demand for housing depends on a number of factors. In general is demand for housing dependent on the number of potential buyers and their willingness (and ability) to pay. In this regard, it is important to think of housing demanders in two ways, as consumers of housing services and as investors looking for a good return on their investment (Case, 1986).

With regards to the price development of housing in various countries, Tsatsaronis & Zhu (2004) point out a number of factors that influence the demand for housing within a country in the long run. In their multi-cross country study, these longer-term factors for demand are growth in households' real disposable income, changes in demographics, permanent changes in the features of the tax system related to home ownership, and the level of mortgage rates. As we review in depth in the following sections, these factors are commonly pointed out in the literature as having an impact on demand and are frequently used when economists analyze housing prices and their development. Tsatsaronis & Zhu (2004) also point out that the prevailing conditions in a country's credit market for housing purchases influences the demand for housing and the price level. Housing, in terms of an apartment or a house is usually the largest asset households buy. Therefore, housing buyers usually need to obtain a mortgage loan in order to buy housing. As a consequence, the demand for housing within a country can depend significantly on the availability of credit, the cost of credit and the flexibility of credit (Tsatsaronis & Zhu, 2004). These credit-related factors can drive fluctuations in housing demand and thus play a key role for the development in the housing prices. In addition, Case & Shiller (2003) has argued that high expectations on future housing prices can increase the demand for housing substantially. These abovementioned factors are commonly re-occurring in the literature as factors that have an impact on the demand for housing. We will now review the abovementioned fundamental factors that drive demand in more detail.

Interest and Mortgage rates

A number of OECD countries have experienced a low interest rate environment that has concurred with rapid increases in housing prices (Sá, Towbin, & Wieladek, 2011). Some authors have argued that an expansionary monetary policy with a consequential low interest rate environment is to blame for a subsequent housing boom (see for instance Hume & Sentence (2009); and Taylor (2009)). Such an expansionary monetary policy with lower policy rates by central banks has been suggested to be an important factor for the creation of asset price booms with rapidly increasing real housing prices. For instance, Goodhart & Hofmann (2008) suggest that there is evidence of a link between monetary variables and asset prices, particularly in times of asset price booms. For a review of the importance of monetary policies in relation to asset prices, see for instance Gerdesmeier, Reimers, & Roffia (2009);

Bordo & Jeanne (2002); and Borio & Lowe (2002), who look at the relationship between asset price booms and busts and their relation with monetary policies.

In a cross-country study, Sá et al. (2011) find that monetary policies that cut the policy interest rates can have a significant and positive effect on real housing prices. Their findings suggest that such monetary policies have relatively larger effects on real housing prices in countries where the country's banking sector is highly competitive and less regulated. Similar to Calza, Monacelli, & Stracca (2009) and Assenmacher-Wesche & Gerlach (2009), Sá et al. (2011) conclude that monetary policy effects have relatively larger effects on the housing prices in countries where the mortgage market is more developed. In this regard, the effects of a repo rate cut should be reflected in relatively higher housing prices in more developed mortgage markets than in less developed mortgage markets. In general, the literature seems to suggest that the central banks have an important impact on asset prices (such as housing) as they set the country's policy rate. The policy rate generally influences the mortgage rates, and through its influence on the mortgage rate it may have substantial effect on the housing prices.

A number of studies indicate that the interest rate on mortgages, the mortgage rate, may be one of the most important factors for the housing prices. Standard theory claims that lower interest rates should increase the value of housing and other long-lived assets (Kuttner, 2012). In this regard, the interest rate is one of the economic fundamentals underlying housing prices (Kuttner, 2012). The costs homeowners and potential housing buyers face for their housing depends significantly on the interest rates on the housing mortgages since most homeowner and housing buyers use mortgages to finance a housing purchase (Englund, 2011). The mortgage rate hence determines the cost for mortgage loans and is therefore important for the amount one can borrow, but also is willing to borrow. A decreasing mortgage rate increases the value of the discounted future user costs and improves households' debt capacity, which increases the demand for mortgages and subsequently housing (Sá et al., 2011). Put in other words, a lower mortgage rate makes credit cheaper and increases the demand for mortgages and housing which can fuel the housing prices.

Studies also show that low mortgage rates may induce households to borrow more money than they otherwise would. According to Sá et al. (2011) are households in highly developed mortgage markets able to use a larger fraction of the housing as collateral, which generally can result in a higher

leverage for a household and thus amplify the effect a decreasing mortgage rate has on housing prices in such mortgage markets.

Property Taxes

Many economists have analyzed taxation in relation to housing prices as taxes and the tax system can have significant implications for the housing price development. Common tax related aspects in the literature for the housing market are the yearly real estate taxation, the capital gain taxation and the tax deductibility of interest payments. Other taxes found in the literature that are suggested to impact a housing price development have been suggested to be changing wealth and income taxation. Svensson (2013) looked at the effects on housing prices that changing wealth and income taxation have along with permanent changes in the effective property tax, the capital gain tax and the tax deductibility on mortgage interest payments. In general, van den Noord (2005) finds that a change to a more advantageous tax treatment of home ownership can increase the housing price volatility.

Higher yearly real estate taxation relative to smaller yearly real estate taxation imply that it becomes less affordable to own housing, *ceteris paribus*. In contrast, decreasing yearly real estate taxation implies that there are stronger incentives to buy and invest in housing (van den Noord, 2005). A decreased yearly real estate tax on housing is reflected in a lower user cost of capital, which generally boosts the demand for housing, but may also affect how much households can afford to pay for housing. Crowe, Dell'Ariccia, Igan, & Rabanal (2011) have suggested that a change to higher property taxation can help limiting rapid housing price increases.

Taxes related to housing are usually collected, as capital gains on housing sales are usually taxed. The relation between the capital gain tax and its influence on housing price growth is however not obvious. Fuest, Huber, & Nielsen (2004) has expressed the view that higher transaction taxes and capital gain taxes on real estate may reduce large swings in housing prices by reducing the incentives of short-term speculation. In contrast, Englund (1986) suggest that higher capital gain taxes on housing may instead be counterproductive to the purpose of stabilizing housing prices, as larger capital gain taxes may make homeowners more reluctant to sell their housing and thus create "lock-in" effects for existing homeowners. With such "lock-in" effects, the homeowners become more reluctant to sell, and the supply of existing housing diminishes which consequently can boost housing prices.

The arguments put forth by Englund (1986) is in line with the recent research provided by Aregger, Brown, & Rossi (2013) who find support for the existence of lock-in effects in the Swiss housing market due to capital gain taxation. The empirical relationship between the level of capital gain taxes and housing prices is ambiguous which Crowe et al. (2011) also recognizes.

Interest payments on mortgage loans are commonly tax deductible to a certain degree. Gervais & Pandey (2008) suggest that many households would repay more mortgage debt if the mortgage interest were no longer tax deductible. In this regard, the ability to deduct interest payments may incentivize households to carry more debt than they otherwise would and therefore be able to pay larger amounts for housing. Crowe et al. (2011) have for instance argued that tax deductibility of mortgage interest payments encourages leveraged housing purchases, and that a reduction of the deductibility could reduce housing prices.

Expectations on Future Housing Prices

What happens in a housing market also depends on the behavior and attitudes of many participants (Case, Shiller, & Thompson, 2012). In this regard can the expectations people have on the future housing prices be of significant importance for the housing prices and the housing price development. Surveys conducted by Case & Shiller (1988, 2003) based on recent housing buyers' expectations show that the expectations on future housing prices appear to be extrapolative. That is, when the housing prices have increased in recent years, housing buyers tend to expect that the previous price development will continue. The surveys conducted by Case & Shiller (1988, 2003) also indicate that many recent housing buyers in booming housing markets expect the housing price development to continue at what may be referred to as "unrealistically high growth rates". Such (overly) optimistic expectations among many recent housing buyers seem to be particularly apparent in rapidly booming housing markets (Case & Shiller, 1988, 2003).

Agnello & Schuknecht (2009) stress the importance of the duration of a boom and suggest that people have a larger tendency to expect rising housing prices in housing markets that have experienced increasing real housing prices during a long period of time. The authors imply that increasing real housing prices above the historical trend for many years may encourage homeowners, potential home buyers and the lenders of mortgages to expect the price development as stable and driven by

fundamentals. Similarly, in relation to housing markets where housing prices have increased during a long time, Case & Shiller (2003) argue that the demand for housing can increase due to outspread speculative behavior where housing buyers generally have high expectations of future housing price increases and capital gains. These are some reasons why (overly) optimistic expectations are strongly correlated with the mentioning of "bubbles". The standard definitions of "bubbles" usually stress that a bubble exists when the asset price, in this case the housing price, differs from the fundamental value as a consequence of overly optimistic expectations on future price or capital gains (see for instance the definition of an asset bubble by Stiglitz (1990, p.13)).

Unrealistic (or overly optimistic) expectations on future appreciation rates in the housing market can induce housing buyers to pay more for the housing than they normally would consider in expectation of future price increases or capital gains (Case & Shiller, 2003). According to Case & Shiller (2003) is such an investment motive an essential feature of what drives a housing bubble but also distracts attention from how much one actually pays for the housing service. High expectations may also form a state of panic in which for instance first-time homebuyers feel the need to buy *now* as they will not be able to afford a home later. Case & Shiller's (2003) bubble theory suggests in general that the subsequent optimism (or panic) for future higher housing prices drive up the housing prices, which reinforces the belief that the housing prices will continue up and encourage housing buyers and investors to bid up the housing prices even further. This phenomenon is precarious, as extrapolative expectations have a tendency of becoming self-fulfilling, which can exacerbate the deviation of housing prices from the underlying fundamentals (Englund, 2011). In essence, high expectations will largely impact the demand if people believe that prices are unlikely to fall, and there is therefore little perceived risk with investing in a home. Furthermore, Holt (2009) says that "irrational exuberance" played a key role in inflating the U.S housing bubble. Shiller (n.d.) defines "irrational exuberance" as "a heightened state of speculative fervor". Holt (2009) argues that all participants in the U.S market "acted on the assumption that home prices would continue to rise".

A widespread optimism of higher future housing prices can also attract additional buyers and speculators with investment motives and expectations of high capital gains. Speculation in the housing market occurs when investors intend to purchase land or real estate in anticipation that there will be a profitable opportunity in the future (Malpezzi & Wachter, 2002). Furthermore, speculation is more

likely to occur when housing markets have experienced long price increases, as expectations on future increase in price is extrapolative. Malpezzi & Wachter (2002) state that speculation can contribute to boom and bust cycles in housing markets. When prices are rising, and are expected to do so in the future, speculators enter the market. This increases demand and reduces supply, contributing to a boom. When prices fall, and are expected to decrease in the future, speculators leave the market. This decreases demand and increases supply, contributing to a bust. Furthermore, the authors claim that the effects of speculation are mostly observed when supply is inelastic.

When the investment motive weakens due to declining expectations of future housing prices, the phenomenon is turned around due to the nature of how extrapolative expectations seem to be formed. A change in public thinking about future housing prices can hence further reduce the housing prices as speculators and investors leave the market while housing buyers become aware that the housing prices can indeed fall (Case, Shiller, & Thompson, 2012).

Income

The importance of income in relation to housing prices is commonly considered in the literature. In this regard, economists frequently analyze the development and the level of real disposable income, the income after taxes. The development in real disposable income has in combination with other factors been used in various studies that intend to analyze the development in housing prices and their sustainability (see for instance Case (1986); Case & Shiller (2003); McCarty & Peach (2004); Coleman, Lacour-Little, & Vandell (2008); and Kennedy & Andersen (1994)). Case & Shiller (2003) and McCarty & Peach (2004) find that growth in real disposable income, in combination with declining real interest rates, can explain a significant part of the rising housing prices on a national level in U.S until 2003, but not thereafter. Similarly, a study on the Swedish housing prices conducted by Frisell & Yazdi (2010) argues that higher disposable income and lower real interest rate from the end of the 1990s until 2010 could explain close to 90% of the price increase that occurred in the Swedish housing market.

The importance of growth in real disposable income and declining interest rates have moreover been shown in cross- and multi-country analyses and have historically been suggested to drive real housing prices (see for instance Kennedy & Andersen (1994), Englund & Ioannides (1997) and Kasparova &

White (2001)). However, the impact the development of real disposable income has on housing prices is indeed ambiguous. Gallin (2003) studied the long-term relationship between housing prices and income on the U.S housing market. He questioned the common view in the housing literature that housing prices are cointegrated with income posed by Abraham & Hendershott (1996); Capozza, Hendershott, Mack, & Mayer (2002); and Meen (2002). According to their view are housing prices and income are suggested to be linked in a long run relationship, and if the housing prices increase more rapidly than household income, the housing prices either need to stagnate or fall. Otherwise, the housing prices would be out of line with the fundamental income. This view is based on the assumption that housing prices and fundamentals are cointegrated (Gallin, 2003). Gallin (2003) finds little evidence for the suggestion that housing prices are tied to the level of income.

The importance of income for housing prices must however be seen in relation to other factors (Case & Shiller, 2003). Case & Shiller (2003) argue that the development in income must be considered in relation to other fundamentals and the housing prices themselves. While it is unclear how and to what degree household income affects housing prices on an aggregate level without taking other factors into account, Gyourko, Mayer, & Sinai (2006) suggest that increasing numbers of households that experience income growth in the right tail of the income distribution can push up housing prices relatively more in highly desirable cities in the US. They note however that these cities also experience supply constraints.

Demographics

Authors claim that demographic factors can affect the aggregated demand of housing (see for instance Tsatsaronis & Zhu (2004), Englund (2011), and Sørensen (2013)). Proterba (1991) suggests that demographic factors in terms of the number of households and their characteristics affect the demand for housing and that these demographic factors therefore should affect the housing prices. Proterba (1991) notes, based on the US housing market, that most individuals increase their consumption of housing between the ages of 20-34; and argues therefore that the share of the population within that age group is important to determine the housing demand. Similarly, Englund (2011) implies that a growing population requires more housing units and that housing demand changes with age. Sørensen (2013) and Englund (2011) suggest that people usually move to larger housing when they establish

families with children but typically downsize as they get older. As a consequence of the different stages in the life cycle may therefore a larger portion of younger people relative to older, increase the demand for housing units (Sørensen, 2013). However, as Englund (2011) indicates, the international empirical studies find it hard to recognize a steady relationship between the age structure and housing prices.

In general, a growing population (or a growing number of households) will increase the demand for housing units, but the demographical change within the population may also impact the demand for housing units. The view of Protebra (1991) suggests that housing prices will increase as the aggregated demand for housing units (due to changes in demographics) increases faster than the supply of housing units. With regards to this, a number of studies indicate that rising housing prices also tend to decrease the home ownership rate among young individuals (see for instance Haurin, Hendershott, & Kim (1993) and Ermisch (1999). Even though demographic factors can help to explain real housing prices, Proterba (1991) stresses that the empirical issue is to determine the impact demography has on the housing price variations. Sørensen (2013) suggests that housing prices may however not need to change much if the changes in demographics are predictable. Based on the predictable need of housing units can the construction industry according to him adjust the supply of housing units in time without creating an excessive demand.

Credit Market

A close relationship between the development of housing prices and credit supply has been well established by Borio, Kennedy, & Prowse (1994), and the Bank for International Settlements (2001). Increasing housing prices can on one hand drive up the demand for mortgages as the housing buyers needs to finance higher housing prices with larger mortgages. On the other hand, increased availability of credit can increase the demand for mortgages, which then may spur housing prices to rise. A close relationship between increased mortgage lending and increases in the housing prices have caused some to argue that rising housing prices may be driven by credit. For instance, Adelino, Schoar, & Severino (2012) find that easier supply of credit leads to higher housing prices; while Mian & Sufi (2009) stress that there is a positive relationship between the credit supply and the real housing

prices. According to Agnello & Schuknecht (2009) is a mortgage market deregulation and credit growth strongly associated with a housing boom stage.

Petursdottir (2015) studies the effects changing credit conditions have on real housing prices. According to her findings do the credit conditions in a country affect the housing affordability among households and therefore the housing prices. She focuses on changes in two credit variables - the mortgage rates and the Loan-to-value (LTV) ratio, as both these affect housing affordability. She argues that the mortgage rates are important because they affect the costs of borrowing a mortgage loan, whereas the size of the LTV ratio is important as it affects the amount housing buyers need to pay in down payment for the housing. A higher LTV ratio makes it easier for housing buyers to conduct a down payment and take on more debt, which may be especially important for housing buyers with lower incomes and savings. Petursdottir's (2015) findings suggest that a surge in the LTV ratio has a positive effect on the real housing prices and lower mortgage rates push up the real housing prices. Petursdottir (2015) simulated changes of the credit conditions simultaneously for the LTV ratio and the mortgage rate to a higher level of the LTV ratio and a lower mortgage rate; she finds that one can expect large price increases in the real housing prices. The overall conclusion is that changes in the credit conditions can have large impacts on the housing price development. Petursdottir (2015) also argues that the mortgage rate may not be the most effective tool in order to dampen a housing boom. Instead, Petursdottir (2015) points to regulatory approaches that directly impact the credit availability. These include regulating the LTV ratio and the lending standards as these have a potential to prevent a large unsustainable housing price development.

Pavlov & Wachter (2011) show that aggressive lending instruments like interest only loans, negative amortization loans and loans with low or zero equity can impact housing buyers and increase housing prices temporarily. According to Pavlov & Wachter (2011), some housing buyers can find it attractive to use these lending instruments, as they otherwise may be credit constrained. When reviewing the Danish housing boom in the 2000s, Sørensen (2013) suggests that low yearly cash flow expenses may have been attractive for new housing buyers and important for the rising prices. According to Sørensen (2013), new housing buyers can be willing to pay a higher price for the housing if the cash flows the first years are low with the use of an interest-only loan (amortization-free loan). Sørensen (2013) suggested two reasons to why housing buyers may find lower yearly cash flow expenses

attractive. First, the lower cash flow expenses that interest-only loans or mortgage loans with low amortizations imply may be attractive to some credit constrained housing buyers. Second, housing buyers may not realize, or care, that lower amortizations today will increase total mortgage payments in the future.

Others also suggests that cash flows are important to housing buyers as potential housing buyers commonly have a monthly budget for the housing expenses they can afford. For example, Tsatsaronis & Zhu (2004) argue that that the nominal amount of monthly payments homeowners conduct for the home ownership seems to be highly relevant for the "purchase decision and therefore the housing prices". For instance, in their article "What drives housing price dynamics: Cross-country evidence" Tsatsaronis & Zhu (2004, p. 74) write:

"A surprising result is that household income has a very small explanatory power over house price movements. Its contribution over the long horizon is less than 10% of total housing price variability. This sharp contrast with the role of interest suggests that purchasing decisions are more sensitive to the nominal amount of monthly payments than to the size of the loan in relation to household income".

The housing prices are also important to the banks that lend out money for housing purchases. When banks provide housing buyers with credit in terms of mortgages, the housing can be used as collateral for the loan (Geanakoplos, 2010). While housing prices are rising, the banks' collateral seems to improve as the perceived value of the housing increases. As many authors have pointed out, a declining interest environment typically increases the demand for housing (Tsatsaronis & Zhu, 2004), while low interest rates can drive a housing boom further as banks may take on more risks (Alessi & Detken, 2009; and Borio & Zhu, 2008). However, if housing prices fall, the fall leads to worse balance sheets for the households and the banks (Kiyotake & Moore, 1997). This is because falling housing prices reduces the collateral value of housing and thus decreases the assets of the homeowners and the banks. The reduced collateral value of housing in turn increases the riskiness of households' debt and should thus increase the related market price of risk (Lustig & Van Nieuwerburgh, 2004; and Geanakoplos 2010). The market pricing of risk may be an important aspect for housing buyers that borrow money as it reflects their own financing costs in terms of mortgage

rates (Geanakoplos, 2010). Even if the pricing of risk is beyond the scope of this thesis, it is important to bring up this aspect as the behavior of banks and their lending also impact how housing buyers can behave. For instance, Pavlov & Wachter (2006) argue that banks may underprice the risk of mortgage default in "good times" when lending out, in search for short-term profit. The underpricing of risks in mortgages (the mortgage rate) may have a large impact on how housing buyers behave and thereby the housing prices (Pavlov & Wachter, 2006). For instance, aggressive lending instruments are considered to have increased the housing prices in the U.S market, and are widely acknowledged to have been a major factor for the booming housing market in the U.S before the global financial crisis (Holt, 2009).

2.3.2 Supply Factors

Surprisingly few economists study the supply side of housing but rather focus on the demand side. Even though the dynamics of housing prices are often studied through the demand factors, the supply side has important implications for the dynamics of housing prices (Paciorek, 2013). The supply of housing can generally be divided into rentals and owned housing. According to Muellbauer (2012) can both the rental market and the market for owned housing impact the housing prices since rental housing can function as a substitute for owned housing. In this regard, the functioning of the rental market directly affects the market for owned housing as people may prefer to rent instead of owning or own instead of renting. With regards to the market for owned housing, Proterba (1991) argues that the market for owned housing can be seen as two different housing markets, a market for new housing construction and a market within the existing housing stock.

Case (1986) notes that only a small proportion of the total housing stock is for sale at a specific point in time, and that these sales sets the price on the entire housing market as real estate agents tend to value housing based on previous sales. The sales price of the existing housing stock is according to this view important for builder's decision to build. Consistent with the "Tobin's Q" model of investment should the supply of new housing increase as long as the cost of construction are relatively less than existing housing prices (Shiller, 2008). Tobin's Q is measured by taking the market values of a completed build (the price at which the housing unit is sold on the market), divided by the construction costs (which in this case is the cost to build) (National Board of Housing, Planning and

Building, 2015b). According to this view will builders continue to build until the gap between housing prices and construction costs is cut (Shiller, 2008).

A number of factors are generally pointed out to impact the housing supply. Tsatsaronis & Zhu (2004) suggest that the long-term factors that influence the supply of housing are the cost of land, the availability of land and construction costs. As Shiller (2008) notes, the supply of new housing is however dependent on the builders' decision to build and these builders face costs for construction labor, materials and land. The supply of new housing can however be negatively impacted by different supply constraints. Factors that may constrain the supply of new housing in the short run can be longer planning and construction phases, as well as slow land planning schemes (Tsatsaronis & Zhu, 2004). Glaeser, Gyourko, & Saks (2005) focus on supply constraints and argue that local development regulations can cause housing prices to increase substantially. These arguments are in line with Malpezzi (1999a, 1999b) and Malpezzi & Maclennan (2001), who show that regulatory constraints can assist explaining housing price dynamics as it affects supply negatively. Furthermore, numerous types of land development regulations may make it difficult for new housing supply to respond to increasing housing demand. Mayer & Somerville (2000) find that more regulation results in fewer construction permits and that the supply of new housing in more regulated housing markets thus is less responsive to higher housing prices. For instance, Høj (2011) refers to a study made on the Dutch housing market, which estimates that the restrictive land use policies in the Dutch housing market can increase the housing prices by around 30%. Based on the U.S housing market, Glaeser, Gottlieb & Gyourko (2010) find that the housing prices increased more in cities where there were more restrictions on new housing supply and where it remained difficult to build relative to other cities.

Shiller (2008) argues that demand shocks cause housing prices to temporarily be disproportionate due to the time it takes to construct new housing, as an imbalance between demand and supply will cause the price to change immediately. According to Shiller (2008) have history shown that housing buyers usually fail to understand that supply will ultimately tend to catch up with price increases. He suggests that this failure may be related to a uniqueness bias that people imagine that the city in which they live is unusually attractive and that the attractiveness of the city increases. According to this view, housing prices may temporarily increase more than if new housing units could be built rapidly. In accordance with the authors above, this view suggests that housing markets with heavy regulations on new

constructions may be particularly sensitive to demand shocks. If, however, the supply catches up with demand due to new housing supply, the housing prices should slow down (Shiller, 2008). According to Englund (2011), a substantial increase in housing prices may be an effect of new supply not being able to meet demand. In other words, supply may be regarded as inelastic in the short run in response to increasing housing prices.

2.4 Measures for Evaluating Housing

As we mentioned in section 2.2, due to the nature of the housing market it is difficult to determine a fair price on housing. There are various ways to assess the misalignments in the prices, or in other words, the over or under-valuation of housing in comparison to its fundamental factors (Browne, Conefrey, & Kennedy, 2013). Economists have developed models using supply and demand factors in attempt to compute the fundamental price. However, these models are proven to have certain disadvantages. For example, the price elasticities of demand and supply may change over time, thereby making the relationships of different factors (such as interest rates and income) unstable. In addition, there may be structural changes in the economy which are difficult to capture (Browne et al., 2013). Therefore, these models have been complemented by other approaches such as affordability indicators (measures). We will now discuss two of these measures.

2.4.1 The User Cost of Housing

In section 2.2 we mentioned that there are costs of capital to operate and maintain a home, which are also known as the user cost of housing. Proterba (1984) developed these costs of capital into a user cost framework that accounts for different factors that in general affect the economy of homeowners, and would affect the economy of potential home buyers. In order to understand the user cost framework, one can think of the user cost as the total costs per year for owning housing (Himmelberg, Mayer, & Sinai, 2005). The annual cost of home ownership has been suggested to include six components that take both the costs and benefits of home ownership into account (Hendershott & Slemrod, 1983; and Proterba, 1984). According to this framework, the first component is the opportunity cost of home ownership. The second component is the yearly property tax that homeowners pay for the housing. The third component is the mortgage interest rate that homeowners pay on their mortgages, accounted for tax deductibility on the interest payments. The fourth

component is “maintenance costs” as a fraction of the housing value. The fifth term is the expected capital gain or loss of the owned home during the year. Finally, the sixth component reflects a risk premium in order to compensate homeowners for the assumed higher risk of owning compared to renting (Himmelberg et al., 2005).

The intention of the user cost of housing framework is to compare the costs of ownership of housing to the costs for rental of an equivalent home. With the framework, one can in theory calculate whether it is more favorable to rent rather than to own, or own than rent. In other words, the purpose of the user cost of capital framework is to determine whether the user costs of housing are "too high" or "too low", compared to the costs of rental (Himmelberg et al., 2005). Simply put, if the user cost of housing is lower (higher) than the rental equivalent, it is more favorable (unfavorable) to own than to rent. This framework suggests that equilibrium in the housing market is when the annual costs of owning a home do not exceed the annual cost of renting (Himmelberg et al., 2005). Furthermore, Himmelberg et al. (2005) argues that unreasonably high expectations on future capital gains within this framework can lead to a housing bubble, as buyers perceive their user costs to be lower than it actually is, and are therefore willing to pay "too much" to purchase a home today.

For example, a study was made on Irish housing prices between the 1980s to 2012 (Browne et al., 2013). The results showed that during the period of the late 1990s until 2008 (when housing prices appreciated the most) user costs of housing was negative for the entire time span, before the Irish housing market crashed simultaneously with the financial crisis.

2.4.2 Price-to-Income Ratio

Another measure that is commonly used to assess whether housing prices are "correctly priced" or "too high" is the price-to-income ratio, as this ratio provides a measure of local housing costs relative to the local ability to pay (Englund, 2011; and Himmelberg et al., 2005). The income measure used is the average disposable income per capita, where disposable income is defined as the gross income from which direct taxes have been deducted. An increasing trend of housing prices that outpace the increase in disposable income may suggest that the housing prices are becoming "too high" (Himmelberg et al., 2005).

Englund (2011) claims that one should see a close relationship between housing prices and disposable income since income is a major component of housing consumption, and since supply is constrained by the scarcity of land. Girouard, Kennedy, van den Noord, & André (2006) surveyed several studies on this relationship and find that implied income elasticities are centered around unity, meaning that a one percent increase in income would generate a one percent increase in housing prices given a fixed supply.

2.5 The U.S Housing Bubble

The rapid real price development in the U.S housing market during the late 90s and early 2000s, and the dramatic drop in housing prices in year 2006 that ultimately lead to the global financial crisis, have attracted much attention in the literature and can therefore provide a good overview of different aspects. The U.S housing prices increased by 74% in real terms between years 2000 to 2006 according to the Case-Shiller/Standard and Poor's price index. The large fall in US housing prices that occurred thereafter (the price index dropped by a third) has caused many notable economists to indeed argue that there was a bubble in the housing market (see for instance Glaeser et al. (2010), and Geanakoplos (2010)).

In 2003, Case & Shiller (2003) started to question the rapidly rising housing prices in the U.S. Case & Shiller (2003) quantitatively analyzed the rapid price development in various states based on some of the "fundamentals": income per capita, population, employment, unemployment, and the average mortgage interest rates. They found that the trend of rising housing prices could partially be explained by rising income and falling mortgage rates. Despite this, Case & Shiller (2003) argued that it seemed apparent that the U.S housing market was facing a "housing bubble". According to Case & Shiller (2003, p. 299-300) can one think of a "housing bubble" in the following way:

"… a situation in which excessive public expectations of future price increases cause prices to be temporarily elevated. During a house price bubble, homebuyers think that a home that they normally consider too expensive for them is now an acceptable purchase because they will be compensated by significant further price increases. They will not need to save as much as they otherwise might, because they expect the increased value of their home to do the saving for them. First-time buyers

may also worry during a housing bubble that if they do not buy now, they will not be able to afford a home later. Furthermore, the expectation of large price increases may have a strong impact on demand if people think that home prices are very unlikely to fall, and certainly not likely to fall for long, so that there is little perceived risk associated with an investment in a home. If expectations of rapid and steady future price increases are important motivating factors for buyers, then home prices are inherently unstable. Prices cannot go up rapidly forever, and when people perceive that prices have stopped going up, this support for their acceptance of high home prices could break down. Prices could then fall as a result of diminished demand: the bubble bursts".

Case & Shiller (2003) based this conclusion on a questionnaire which indicated that recent housing buyers had high expectations of future housing prices, and that the recent housing buyers generally had a strong investment motive in housing. According to their study, recent housing buyers expected the housing prices to increase rapidly in the future. In some cities, the average expected price increase was as high as 13 to 15 percent per year (Case & Shiller, 2003). The conclusion that the housing market in the U.S appeared to be in a bubble was however questioned by Quigley (2003), Himmelberg et al., (2005), and Smith & Smith (2006). Himmelberg et al., (2005) argued that it was impossible to definitely say whether there was a bubble or not in the U.S housing market.

Himmelberg et al. (2005) indicate that the low interest rate between 2001 and 2005 can explain the rapid increase in the U.S housing prices in various areas. In contrast, Glaeser et al. (2010) find that a one percent decrease in the interest rate in the U.S can, at most, explain an increase in the housing prices of 10%. They argue that the interest rate alone cannot explain the whole price development as the real interest rate fell by 1.3 percentage points between 2001 and 2006. The work of Glaeser et al. (2010) does however indicate that a decreased interest rate can increase housing prices relatively more in cities where the supply of housing is limited.

Others have focused on credit related aspects when analyzing the housing price development in the U.S. Justiniano, Primiceri, & Tambalotti (2015) for instance argue that the housing price development in the U.S primarily was a consequence of increased credit supply to housing buyers. They use a model of household borrowing in order to analyze the drivers of what they call the boom and bust in credit and housing prices. Their findings provide some empirical facts that they argue characterized

the U.S housing boom. They find that the rapid rise in housing prices (the real home prices increased by around 40 to 70% between years 2000 to 2006), co-occur with rising household debts and decreasing real mortgage rates (the real mortgage rate had fluctuated around 5% during the 90s but decreased to around 2 to 3%) as the housing prices increased.

Geanakoplos (2010) reviews the rise and fall in the US housing prices and argues that the rise and fall in housing prices were a consequence of the so-called "leverage cycle". In his view, the housing prices increased due to expansion of leverage. Based on data on the U.S housing market, Geanakoplos (2010) shows that rising housing prices and declining down payments are related. On the way up, housing prices rise as new housing buyers can buy housing with less and less down payment but with higher and higher leverage. According to Geanakoplos (2010) are housing prices central to the leverage cycle due to the nature of housing as an asset. When a housing buyer intends to buy a house, the potential borrower has a hard time obtaining a loan if the lender cannot be convinced that the loan will be safe. The borrower must therefore offer some type of collateral that can work as a guarantee for the loan (Geanakoplos, 2010). The view of Geanakoplos (2010) is that with greater leverage, asset prices increase which in turn increases the value of collateral, which can push up prices further. This process can be fed-back, fueling further price increases. However, prices cannot go up forever as there is a limit on how much leverage can increase and the number of new housing buyers that can enter the market (Geanakoplos, 2010). In the end of the U.S housing boom, the required down payment for housing buyers had fallen to only 3.2 percent (this is an LTV ratio of 96.8 percent) while the housing prices peaked. The high LTV ratio for new housing buyers, providing only 3.2% of the housing purchase in down payment, implied that lenders started to question the reliability of the mortgage borrowers and the risks associated with the lending. As Geanakoplos (2010) shows, the required down payment rose rapidly to 15.9 percent (an LTV ratio of 84.1 percent) in order to deal with the riskiness and falling housing prices. Raised down payment requirement implies that new potential housing buyers need to bring in more money than the previous buyer. As a consequence, when a larger down payment is needed, it is harder for the marginal buyer to enter the housing market, which starts to close them out (Geanakoplos, 2010). Once new potential housing buyers find it harder and harder to enter the market, the housing prices start to drop. This is when the "leverage cycle" starts to turn around. The previous availability of easy and cheap credit diminishes, and the tighter credit can thus

further diminish the ability of potential housing buyers to obtain mortgage loans. In this regard, Geanakoplos (2010) stresses the importance of collateral in a housing market. Since housing commonly are bought with the use of collateral on housing, a decrease in housing prices decreases the value of the collateral. As a consequence, falling housing prices can cause housing prices to decline further due to decreasing collateral.

When lenders raise the mortgage rates (as lending becomes riskier), some homeowners find it harder to service their mortgages. Homeowners with high degree of leverage in the U.S experienced problems in the housing market when things started to change (Geanakoplos, 2010). As many homeowners in the U.S had bought housing with a high leverage (high LTV ratio), once the housing prices started to fall, millions of homeowners found themselves with larger debts on their housing than the value of their housing (Geanakoplos, 2010). In addition, homeowners started to have problems to refinance their mortgages, and many found it more favorable to "walk away" from the house than to keep it. Without getting into detail about the US housing market and the various flaws in incentives during the housing boom, when households become heavily indebted and face problems servicing their mortgages and/or have incentives to walk away from the housing, the number of housing units for sale can increase substantially as many homeowners want to sell at the same time, causing further price falls.

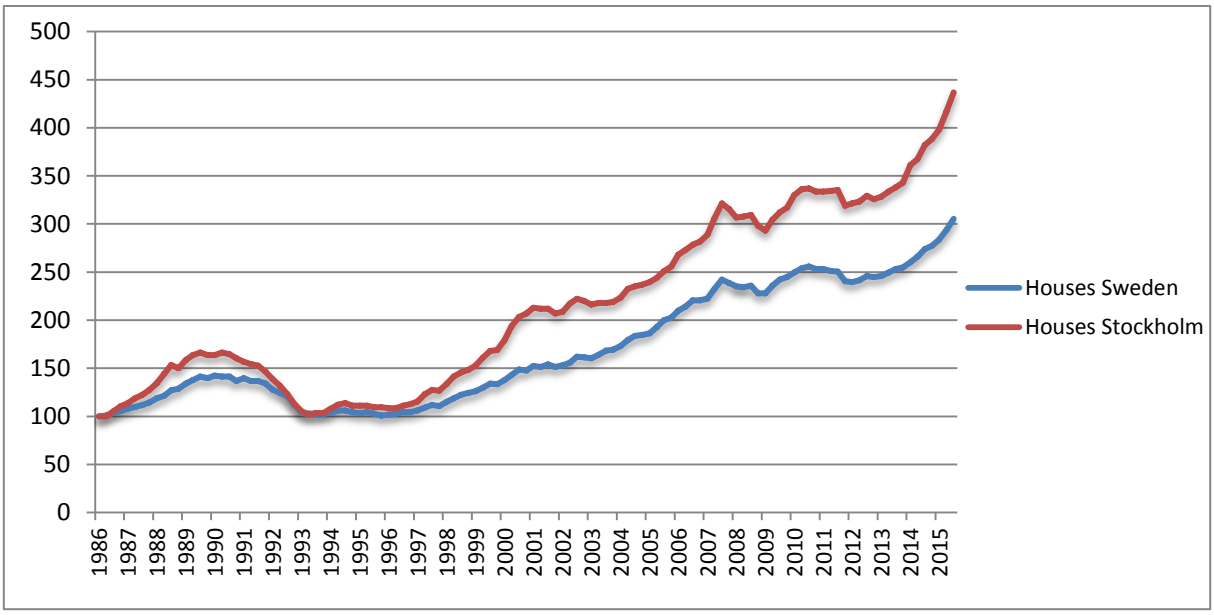
As the review of the literature on the US housing market shows, there are different ideas of factors that drove and impacted the price development of housing on a national and local basis. It is also important to note that the housing price development were different in different areas. The review provides an understanding of factors that can impact rapidly increasing housing prices. Moreover, the review reflects that housing prices can change rapidly. The review touches upon the impact difficulties to service mortgage loans and reduced housing prices can have for housing buyers with large leverage. Perhaps most importantly, it provides an understanding of how housing prices can move in cycles of booms and bust patterns.

3. The Price Development in Stockholm

The section focuses on the price development in the housing market in Stockholm since 1986. This timespan also includes the Swedish banking crisis between years 1990-1993. The housing market in Stockholm contains both houses and tenant-owned apartment and as we will see, the price development in these has been somewhat different. This section will be the foundation of the thesis, as the subsequent sections will refer to the price development.

Housing price indexes are useful in order to grasp the price development in housing, but there is no standard methodology for constructing housing price indexes (Kuttner, 2012). An index can either be adjusted for the inflation or include the inflation. An index adjusted for inflation shows the real price development which better reflects the change in purchasing power of a potential buyer over time. To underline the significant price development in the housing market we provide a 30 year long time series of how the real house prices have developed in Stockholm and Sweden (graph 1). This time series does however not include the price development in tenant-owned apartments. When we mention *apartments* throughout this chapter, we are only referring to tenant-owned apartments that have been purchased, excluding those available for rent, as apartments for rent do not contribute to the price index. Apartments make up a large part of the total housing in Stockholm but indexes of the price development in apartments are only available since 2005. We provide an index that shows the real price development of apartments and houses in Stockholm and Sweden in the same time series with the starting year 2005 (graph 2). Note that the separation of houses and apartments in the index is not of major importance since we provide the index to show the general price development in the housing market rather than individual differences in the price development between houses and apartments. Furthermore, the intention of this thesis is not to handle the price development in houses and tenant-owned apartments separately, but rather to obtain a picture of how the housing prices have increased over time.

Graph 1. Real price development for houses



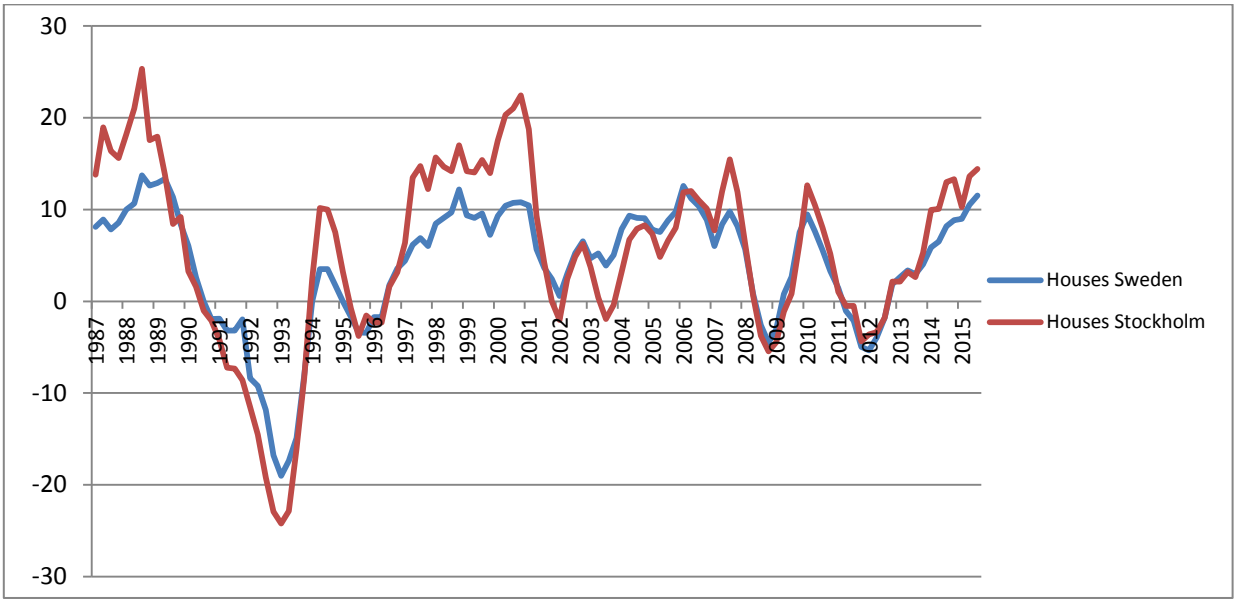
Source: Ekonomifakta; and own calculations.

Graph 1 shows the real (inflation-adjusted) price development of houses in Sweden and Stockholm between years 1986-2015, indexed at year 1986.

Sweden and Stockholm experienced falling house prices on a nationwide basis in the early 90s during the Swedish banking crisis. Since then the real house prices have trended upwards with only small and quite temporary price drops. We see that the real house prices have increased more in Stockholm than the rest of Sweden according to the index. Since the mid-90s until today, the real house prices in Stockholm have increased by around 330% whereas the real house prices in Sweden have increased by around 200%. The real house prices in Stockholm started to advance more than the rest of Sweden in the late 90s and have since continued to widen the gap. During the global financial crisis around year 2008 did the real house prices in Stockholm, for the first time since the early 90s, experience a period of falling prices. However, the falling prices recovered rapidly and were just a few years later back to even higher levels than prior the crisis. Since the financial crisis in 2008 has the rate of growth taken off in both Sweden and Stockholm, but the real price increase in Stockholm has been larger than the rest of Sweden.

Numerous studies show that housing prices move in cycles and that there is a tendency for housing prices to revert to the long-term trend (Englund, 2011). Agnello & Schuknecht (2009) stated that the booming Swedish housing prices that started in 1997 and ended in 2008 stands out as the longest boom out of the 18 developed countries. The remarkable point is however not that the boom turned into a bust when the financial crisis hit, but that the price development was able to recover quickly, only to increase further. This, during a time when most countries suffered severe falls in housing prices (Agnello & Schuknecht, 2009).

Graph 2. Annual growth rate of house prices



Source: Ekonomifakta; and own calculations

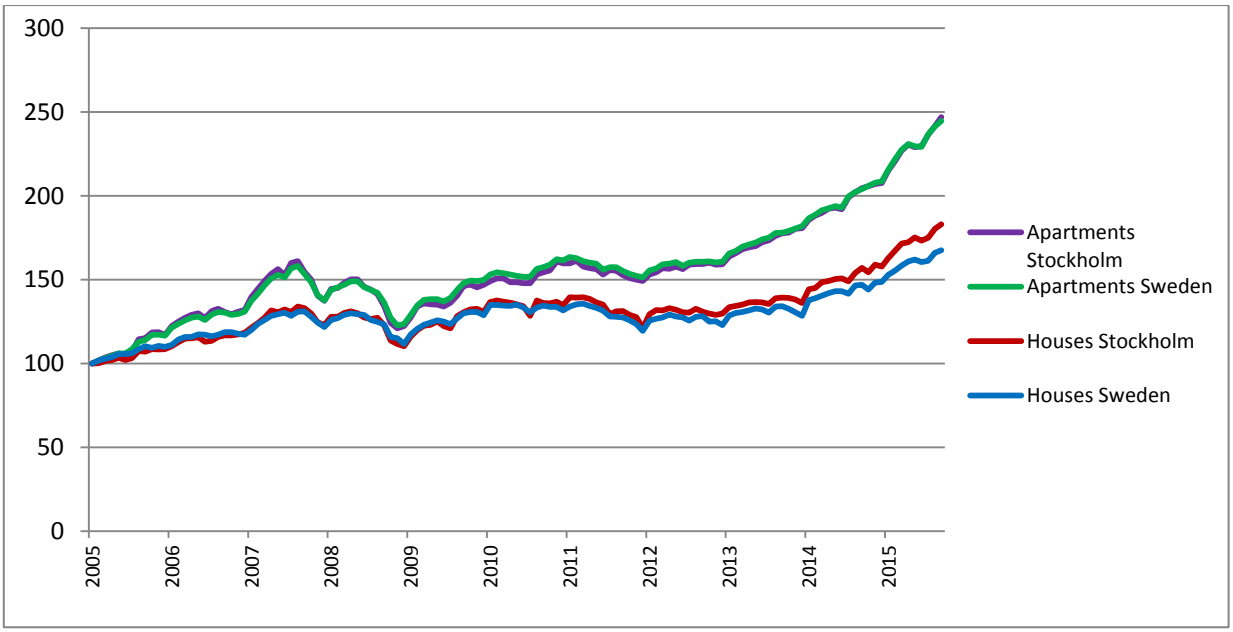
Graph 2 shows the yearly growth rate for houses in Sweden and Stockholm based on the real price development index between years 1987-2015. The values are calculated using percentage change of the corresponding month from the previous year. A positive value (>0) indicates that prices have increased since the previous year, and a negative value (<0) indicates that prices have decreased since the previous year.

By providing annual growth rates, graph 2 better illustrates the sensitivity and movement of house prices in Stockholm (red line) in comparison to Sweden (blue line). There are two interesting points deducted from the data. First, notice that the crests of houses in Stockholm are generally higher than

for houses in Sweden, and troughs are lower. This suggests that the market for houses in Stockholm is more sensitive to macroeconomic factors than for Sweden. In good times, prices in Stockholm increases at a quicker rate, and in bad times the prices fall at a quicker rate. For instance, in 2000-2001 Stockholm witnessed remarkable growth of house prices at above 20% in one year, whereas prices for Sweden only grew by 10%. The second point is that in 2008, the prices for houses in Sweden witnessed its first negative growth rate since 1997. As mentioned, Agnello & Schuknecht (2009) marked this as the end of the boom, as the article was published in 2009 when the house prices were falling. We assume that the authors expected house prices to decrease further, marking the end of the boom cycle. However, the negative growth rate only lasted for approximately 1.5 years before increasing again. Similarly there was a small period in 2011-2012 where prices were decreasing, but this was also short-lived. Therefore we argue that 2008 was never the end of the boom, but only temporary drops in prices. Instead it can be claimed that the boom of house prices has been ongoing from 1997 until today, an astonishing 18 years.

Until now, we have only been looking at the price development for houses in Stockholm and in Sweden. But as we know, the housing market also consists of other housing units - the most significant is tenant-owned apartments which constitute a large portion of the housing market.

Graph 3. Real price development for houses and apartments



Source: Valueguard; and own calculations

Graph 3 is a "quality adjusted" price index which takes into consideration that there are different types of housing units sold each month. The index is based on the previous months sales – provide by realtors reported sales. The values provided from Valueguard are originally in nominal amounts. We have adjusted the values for inflation (from Worldwide Inflation Data) to show the real price development. Values are given for houses and apartments in Stockholm and Sweden, between years 2005-2015, indexed at year 2005.

Valueguard's price index for houses (red and blue line) follows the same trends as the index from Ekonomifakta, which is to be expected. The trend is increasing with brief decreases in prices between 2007-2009 and 2011-2012, and houses in Stockholm have increased at a slightly faster rate. Apartments for both Stockholm and Sweden follow each other very closely, and have increased at a much faster rate than for houses since 2005. On the other hand, when prices are decreasing, apartment prices seem to decrease at a faster rate than for houses. For instance, we can see in graph 3 that apartments fell at a faster rate during mid-2007 to 2009. This suggests that apartments are even more sensitive to macroeconomic factors than houses.

We find it interesting that apartment prices have risen at close to identical rates in Stockholm and Sweden, but the house prices have increased faster in Stockholm than Sweden. Though we acknowledge this phenomenon, there may be many factors that contribute to this discrepancy between house price movements and apartment prices movements, which is not the focus of this thesis. Also, one must realize that even though the apartment prices increase at a similar rate in Stockholm and Sweden, nominal prices differ. Apartments are more expensive in Stockholm than other parts of Sweden, so even though the rate of increase is the same, the nominal prices in Stockholm are more expensive. For example, imagine two apartments: one valued at 500,000 SEK, located in a small town in Sweden, and one at 1 million SEK, located in Stockholm. Both increase 100% over a given time span. The first will then be valued at 1 million, whereas the other will be valued at 2 million SEK. The second has increased by 500,000 SEK more in nominal amounts than the first. If one were to provide an index for both apartments and houses together, the index for Stockholm will still be higher than for Sweden (the difference being the price development of houses). Unfortunately there is no index

available for both apartments and houses in Stockholm. The difference between the indexes (Stockholm versus Sweden) is difficult to determine, as the weights of houses versus apartments is unknown.

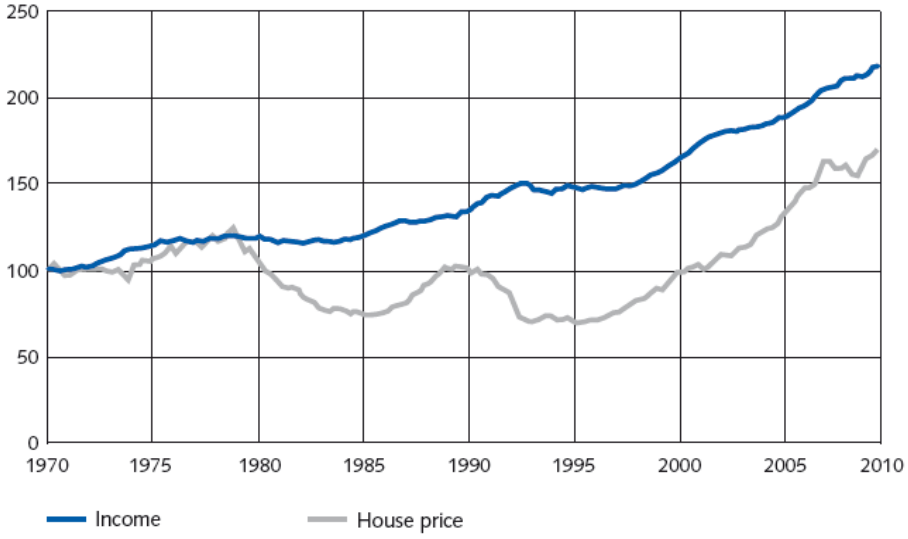
To conclude, housing prices in Sweden, and especially in Stockholm, has had an impressive growth the past 20 years. When comparing apartments to houses, apartments have grown at a faster rate than houses. The effect of the financial crisis in 2008 only seemed to affect Sweden briefly, whereas other countries suffered vast plummets in housing prices. Sweden's housing prices were on the rise just 1.5 years later. Since 2012, housing prices have increased at an exponential rate, hitting new records every month, and the prices in Stockholm are now at an all-time high. Although Agnello & Schuknecht (2009) claim that 2008 was the end of the boom in Swedish housing prices, we argue that the boom has continued until the present day.

4. Housing Prices and Disposable Income

The section will be looking at disposable income in comparison to house price development for both Stockholm and Sweden. By comparing the disposable income of households with the price development of houses, it provides an affordability measure for households (the ability to pay for housing purchases and household operating costs).

As we showed in the literature review in Section 2, several studies indicate that there is a relationship between housing prices and disposable income. Girouard et al. (2006) claim that this relationship is around unity, based on a survey of several studies. Englund (2011) provided a graph to show the relationship between housing prices and disposable income in Sweden.

Graph 4. Disposable income and house prices



Note. Four-quarter moving average of disposable income (from National Accounts).

Source: Englund, 2011, p. 60.

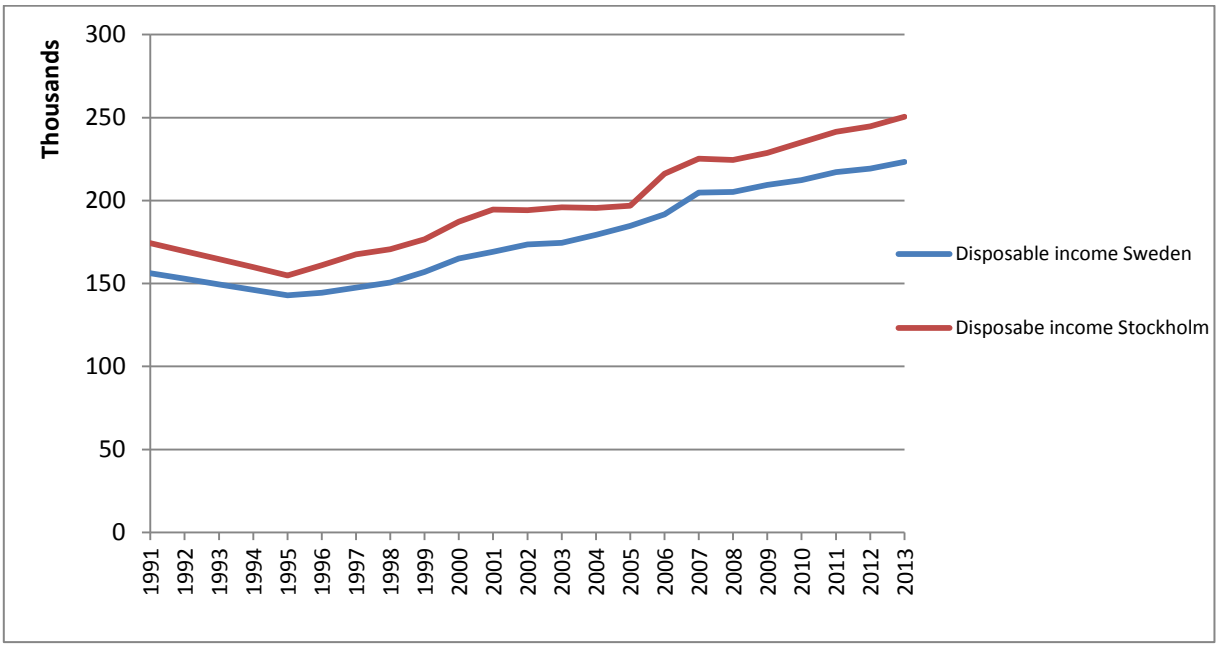
Graph 4 shows the relationship between average real disposable income and real house prices in Sweden between years1970-2010, indexed at year 1970.

The graph shows that over the long term, real average disposable income has increased at a faster rate than real house prices. The real income in terms of real house prices was approximately 30% higher in

2010 than in 1970. However, notice that the relationship does not correlate closely. Englund (2011) suggests that a partial reason for this is that consumption of housing is more permanent in comparison to other goods. Since 1995, house prices have increased at a faster rate than disposable income.

However, we argue that looking at the average disposable income per capita does not say much of the actual affordability of a single household, as it does not take a family's size into consideration. Imagine two separate households with identical yearly disposable income. One household consists only of two grown adults, whereas the other household consists of two adults and four children. The household without children will generally have more money after necessary consumptions have been made (food and other necessities). A measure that takes this into consideration is the "Equalized disposable income", which is a more accurate indicator of a household's affordability (Stockholms stad, 2012). Each household is given a number of "consumption units" per household is based on the number of persons per household - the first grown adult is given a unit of 1.00, and the remaining persons are given a smaller unit after a fixed scale (see scale in **Appendix 1**). The total disposable income of the household is then divided by the number of consumption units.

Graph 5. Equalized disposable income

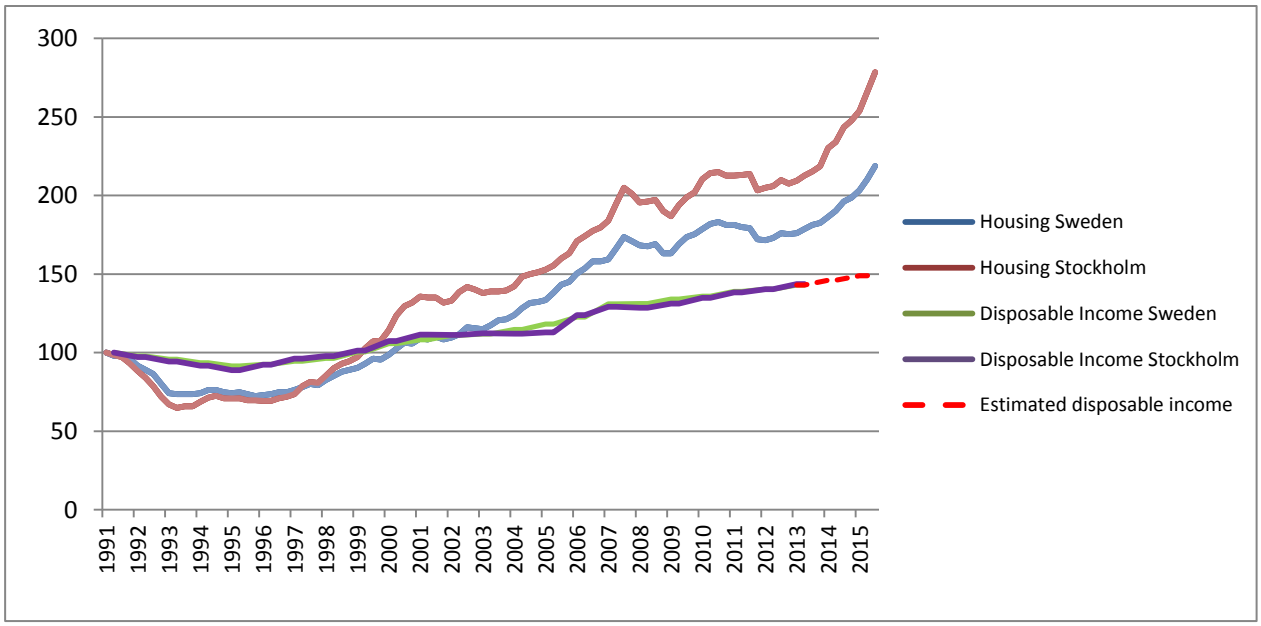


Source: Statistics Sweden; and own calculations

Graph 5 shows the equalized disposable income per year, in median values, for households with at least one adult above 20 years of age, given in 2013 year prices. The values are given for both Sweden and Stockholm between years 1991-2013. There is no available data before 1991 or after 2013.

During the period 1991-1994 there was a close to constant decline in equalized disposable income in Sweden and in Stockholm. Interestingly, Englund's (2011) data does not show this decline (graph 4), during a time when Sweden was experiencing a banking crisis. Perhaps this suggests that equalized disposable income might be a better indicator to show a household's real economic affordability than average real disposable income. Notice that the lines move closely and are more or less parallel to one another, and that equalized disposable income in Stockholm has been consistently higher than for Sweden throughout the time span. On average, the equalized disposable income in Stockholm has been approximately 12% higher than for Sweden since 1991. This suggests that residents in Stockholm can afford more expensive housing, which may partially explains why housing prices in Stockholm are higher than for Sweden as a whole. Since 1991, the real equalized disposable income has grown approximately 43% for both Stockholm and Sweden.

Graph 6. Equalized disposable income and house prices



Source: Ekonomifakta; Statistics Sweden; and own calculations

Graph 6 shows the relationship between real equalized disposable income and real house prices for both Sweden and Stockholm, for years 1991-2015, indexed at year 1991. Data for equalized disposable income for years 2014-2015 is not available, so we have made an estimate for these years based on the considerably consistent trend since 1995 (red dotted line).

The trend in graph 6 shows that since 1991, house prices have increased at a faster rate than for equalized disposable income. House prices for Stockholm and Sweden are respectively 83% and 45.8% higher than equalized disposable income in 2015, in comparison to 1991. During the banking crisis between years 1991-1994, housing prices fell at a quicker rate than the disposable income. Notice that housing prices in Stockholm fell faster than for Sweden, as did the equalized disposable income for Stockholm in comparison to Sweden, if only ever so slightly. Since approximately 1995 housing prices started to increase again, simultaneously with the equalized disposable income. During the period 2001-2005 disposable income flattened out for Stockholm, and was fairly constant, whereas disposable income for Sweden continued to increase. During this time we also witness the only period where the rate of housing prices was increasing at a *slower* rate than for Sweden.

So, this data suggests that there is a real relationship between housing prices and equalized disposable income; however it is not close to unity. Housing prices have increased at a much faster pace than equalized disposable income, so households' affordability has decreased significantly over time. Notice that only house prices are used in the graph, excluding apartment prices. This is because apartment prices are only available since 2005. However, recall that the apartment prices have increased at a faster rate than house prices, so since 2005, the price development for apartments have been even faster than for house prices, and thereby widened the gap between housing prices and equalized disposable income further. Also notice the volatile trend in housing prices in comparison to the stable trend in equalized disposable income. This suggests that even though a relationship between housing prices and disposable income exists, it can only explain a small part of the housing price behavior.

5. User Cost of Housing

This section will be looking closer at three fundamental factors, which are considered to be essential components of the user cost of housing framework (Review Section: 2.4.1).

*The **first factor** we discuss is the development regarding housing taxation (regulatory environment). We first review how the yearly taxation has changed and what this means to existing homeowners and potential home buyers in Stockholm. We then analyze how the capital gain taxation has changed and how it may impact the housing market in Stockholm. We show that tax regulations have had major impact on homeowners' cash flow.*

*The **second factor** we discuss is expectations of the future housing prices. Expectations on future housing prices (and thereby expectations on future capital gains) can be a significant factor that may affect both current homeowners and potential home buyers. By discussing expectations we hope to provide an understanding as to how the expectations of the future housing prices actually have a real effect on the development of the housing market.*

*The **third factor** we discuss is the development in the mortgage rates since 1985 until today. We discuss how the mortgage rate development impacts the cost of capital among existing mortgage borrowers and potential mortgage borrowers. We then look further into the development of choosing fixed rates or variable rates over time, and what implication this has on mortgage borrowers. In addition, this section discusses the link between lower cost of capital through declining mortgage rates and rising housing prices.*

At the end of the chapter we will construct a simplified version of the user cost model consisting of these three components.

5.1 Regulatory Environment Developments

The Swedish housing market has in recent years gone through a number of changes in the tax system. In 2008, the yearly taxation on housing was abolished and a local fee with a maximum tax cap was

implemented (Frisell & Yazdi, 2010). To cover for the tax losses from the abolishment of the yearly taxation on housing, the capital gain tax for sales of housing was increased from 20% to 22% (Frisell & Yazdi, 2010). These changes have reasonably affected the housing market dynamics for homeowners.

5.1.1 The Abolishment of the Yearly State Real Estate Taxation

Prior to 2008, the states real estate tax for apartments and houses were based on the assessed value that should correspond to 75% of the market value. Homeowners were then taxed every year based on the assessed value of the housing. The tax amounted to 1% of the assessed value for houses and to 0.4% of the assessed value for tenant-owned apartments (Stenkula, 2014). In 2008, this yearly property tax was removed and replaced by a lower municipal property fee with a maximum cap (Frisell & Yazdi, 2010; and Stenkula, 2014). For house owners, the fee has a limit of maximum 6,000 SEK per year but is not more than 0.75% of the assessed value of the house. For tenant-owned apartments, the cap is set at 1,200 SEK per apartment each year but not more than 0.75% of the assessed value (Swedish Tax Agency, 2012). Since the maximum cap levels are different for houses and apartments, we provide examples of how the changed taxation impacts the tax costs for homeowners of houses and apartments respectively.

5.1.2 Impact of the Tax Change for Owners of Houses

Prior to the change in 2008, a house owner with a market value of 1 million SEK for the house would have to pay (0.75 * 1,000,000) * 0.01 = 7,500 SEK in yearly taxes. With the new taxation, the yearly tax for a house with a market value of 1,000,000 is (0.75 * 1,000,000) * 0.0075 = 5,625 per year. The difference is not large for houses that have an assessed market value of 1 million SEK. However, the prices of houses in Stockholm are much more expensive than this. Prices around 10 million SEK for houses in Stockholm are not uncommon, and using 10 million SEK in an example provides another and more realistic picture of how the tax regulation can impact the house owners (for example, the average prices of houses in Bromma (a region within Stockholm) are even higher, at around 14 million SEK). With the old real estate tax system, a house with an assessed value of 10 million SEK, the tax is (0.75 * 10,000,000) * 0.01 = 75,000 SEK per year. With the current tax system, a house with an assessed value of 10 million SEK only pays the cap amount of 6,000 SEK per year. The

difference in terms of tax costs in the previous tax system and the current tax system seems to be highly significant for houses in Stockholm. Moreover, the benefit of the changed taxation increases gradually the larger the assessed value of the house is. The change to the current tax system allows house owners, that have an assessed value of 10 million SEK, to have (75,000 – 6,000) = 69,000 SEK extra cash per year. Although, the example is on the higher end, it indicates that house owners in Stockholm in general have increased their cash flow significantly with the introduction of the yearly taxation cap.

Graph 7. Real estate tax for houses

Source: Own calculations

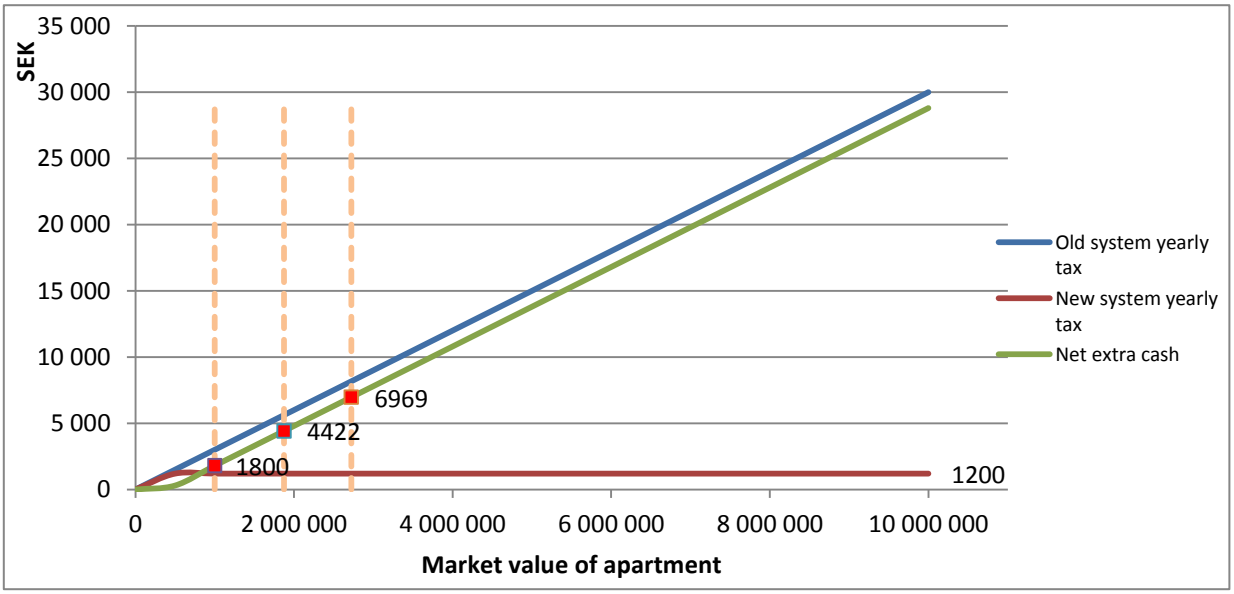
Graph 7 shows the yearly real estate taxation for houses in Stockholm, comparing the old system versus the new system of taxation, given different market values of house. The orange dotted lines represent net extra cash of the two examples previously used, of 1 million and 10 million SEK market value houses.

From the graph we can see that the higher the assessed value of a house, the more the householder has benefited from the tax reformation. The amounts are quite substantial.

5.1.3 Impact of the Tax Change for Tenant-Owned Apartments

Because the association of tenant-owned apartments owns the apartments, the tenant owner pays the tax via its monthly fees. Prior to the change, an owner of an apartment with an assessed market value of 1 million SEK would have to pay (0.75 * 1,000,000) * 0.004 = 3,000 in tax per year. With the "local fee", after 2008, the same owner has to pay the lower 1,200 SEK per year due to the tax cap. A market value of 1 million SEK for an apartment in Stockholm is however not common. When the local fee was introduced 2008, the average price for a tenant-owned apartment in greater Stockholm was around 1,874,000 SEK (Statistics Sweden, 2015). With a market value of 1,874,000 SEK, the previous state real estate tax per year would be (1,874,000 * 0.75) * 0.004 = 5,622 SEK. In 2014, the average price for a tenant-owned apartment in greater Stockholm was 2,723,000 SEK (Statistics Sweden, 2015). With a market value of 2,723,000 SEK, the former yearly real estate tax per year would be (2,723,000 * 0.75) * 0.004 = 8,169 SEK, for an average tenant-owned apartment in Stockholm. In central Stockholm some of the more luxurious apartments in central Stockholm are in the tens of millions, and thereby the net extra cash due to the tax reformation can be substantial for apartment owners as well.

Graph 8. Real estate tax for apartments



Source: Own calculations

Graph 8 shows the yearly real estate taxation for apartments in Stockholm, comparing the old system versus the new system of taxation, given different market values of apartments. The orange dotted lines represent net extra cash of the three examples previously used, of 1 million, 1,874,000 million and 2,723,000 million SEK market value apartments.

The graph is similar to that of houses as the higher the market value of apartment, the more the householder has benefitted from the tax reformation. However, the amounts are not quite as substantial as for houses. For example, the net extra cash per year for a 10 million SEK house is 69,000 SEK per year, whereas the net extra cash per year for a 10 million SEK apartment is 28,800 SEK.

5.1.4 The Increased Capital Gain Tax on Housing Sales

The relation between the capital gain tax and its influence on housing price growth may not appear obvious. Fuest et al. (2004) has expressed the view that higher transaction taxes and capital gain taxes on real estate may reduce large swings in housing prices by reducing the incentives of short-term speculation. However, Englund (1986) and Aregger et al. (2013) find that higher capital gain taxes on housing may instead be counterproductive to the purpose of stabilizing housing prices, as larger capital gain taxes may make homeowners more reluctant to sell their housing and thus create "lock-in" effects for existing home-owners. With such “lock-in” effects, the homeowners become more reluctant to sell and the supply of existing housing diminishes which consequently can fuel housing prices. In 2008, when the yearly taxation was abolished and the lower “local fee” was introduced, the tax on capital gains on housing increased from 20% to 22% (Frisell & Yazdi, 2010). In order to understand the implications of the higher capital gain tax we provide an example of how the capital gain taxation impacts a housing sale.

5.1.5 The Impact of the Capital Gain Tax on a Housing Sale

Households that bought their house in Stockholm 20 years ago for 2.5 million SEK would today enjoy a 300% increase in real value (inflation-adjusted), and would be able to sell it for 10 million SEK today. The capital gain is: (10,000,000 - 2,500,000) = 7,500,000 SEK. The capital gain is however taxed after the deduction for transaction costs in terms of a real estate agent. The fee to the real estate agent in Stockholm is commonly around a few percentages (~2-4% is considered normal) of the sales

amount, or a fixed payment that may be negotiable. The fees vary as they depend largely on the real estate agency firm and location (Blom Westergren, 2014, Oct. 14). To illustrate the impact of a housing sale with the current capital gain tax, we use a conservative measure of 2% of the sales amount as the fee to the real estate agent which becomes (2% * 10,000,000) = 200,000 SEK.

7,500,000 – 200,000 = 7,300,000 is the capital gain after deduction for the real estate agent fee. This capital gain of 7,300,000 is taxed at 22%: 7,300,000 * 0.22= 1,606,000 must be paid in capital gain taxes for the housing sale. At the old capital gain tax rate of 20% this would amount to 1,460,000, a difference of 146,000 SEK. Until 2007, the whole tax on the capital gain could be postponed on the condition that the new housing was more expensive than the sold housing (Swedish Tax Agency, 2012). In 2008, the amount possible to postpone was limited to 1,600,000 SEK but then changed to 1,450,000 SEK in 2010 with a yearly interest of 0.5% on the postponed amount (Swedish Tax Agency, 2012). Due to the fixed interest of 0.5% on the postponed amount and the current low interest rate combined with the interest deductibility of 30%, it is today generally acknowledged that it is favorable to pay the capital gain tax immediately instead of postponing it (Crofts, 2014, Apr. 7). Thus, the additional 2% in capital gains tax (in this case 146,000), combined with not being able to gain anything by postponing the amount to another household, may make the homeowners more reluctant to sell, which contributes to the "lock-in" effect.

5.1.6 The Tax Change Effect on Demand and Supply for Housing

The changes on the features of the tax system seem to have had a substantial impact on the housing market in Stockholm. The new taxation systems result in lower taxes for homeowners than the old taxation system did. The difference is particularly large for higher assessed values of housing. Because housing in Stockholm in general already had higher market values than other parts of Sweden when the maximum cap was introduced, the maximum cap has lowered the recurring tax costs for homeowners in Stockholm in particular. The reduced recurring tax costs improve homeowners' cash flows and make it more affordable to own housing in Stockholm. This change has effectively decreased the user cost of capital for housing, which increases the incentives to own a home. When homeowners find it more affordable to stay in the current housing due to the lower yearly taxation costs, it becomes easier to keep the housing, which should lower the supply of the existing housing

stock further. Lower recurrent taxation should furthermore have contributed to increased demand for more expensive housing within Stockholm, since more expensive housing is not taxed harder than low valued housing. While the maximum cap should increase demand for more expensive housing within Stockholm it should also lower the supply of more expensive housing. An increased demand combined with a simultaneous decrease in supply push the housing prices upwards.

What furthermore seems to contribute to the price dynamic is the increased capital gain tax. The higher capital gain tax makes it more expensive to move compared to before, which should contribute to relatively lower supply. The supply of highly valued housing may be particularly reduced due to the progressive tax savings that the current tax cap result in, compared with the previous taxation. Moreover, the increased capital gain tax, combined with the price development, affects the nominal amounts that sellers of housing will have available for new housing purchases and hence "how much housing" they can buy for that amount in the same market. When less money become available for new housing purchases after a housing sale, due to the increased capital gain tax, the homeowners should become more reluctant to sell their existing home. Homeowners may be particularly reluctant to sell if they would have to buy in the same market as they sell. Due to the price development in the housing market, the longer time a household in Stockholm has owned the home, the larger the capital gains tax becomes in nominal amounts. Hence, homeowners that have owned the housing for a longer time may be particularly reluctant to sell the housing if they might as well are able to keep the housing, which the significantly lower yearly tax has facilitated.

5.2 Expectations on Future Housing Prices

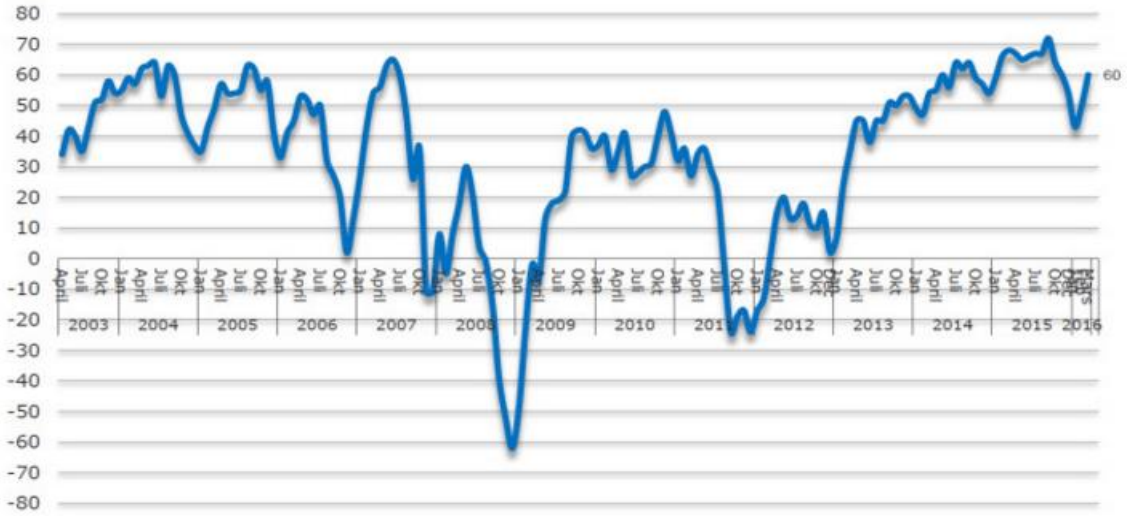
Expectations on future housing prices (and thereby capital gains) is one of the most essential components in the user cost framework (Browne et al., 2013). Given that expectations on an increase in capital gain is high (i.e. a high proportion of people that believe an increase in housing prices is very likely), it will have a significant impact on user costs and price development. High expectations on capital gains can even generate negative user costs. That is, the expected capital gain exceeds the total funding costs of housing, essentially making housing consumption *free,* and the owner can expect a capital gain on top (Englund, 2011). This allows for homeowners to have very expensive housing costs as long as the expected capital gain will cover these costs; making owning a home a

favorable investment. Recall that overly optimistic expectations on housing prices have been one of the key components for the cause of the housing bubble inflation in the U.S. Since expectations is such an important component of user costs, we will attempt to look closer into the expectations of housing prices in Stockholm, and what effects this may have.

Case & Shiller (2003) did a thorough investigation on expectations on the housing market in the U.S, and found a fallacy in the interpretation of closing prices. When closing prices are higher than asking prices, this may cause *"panic buying and prices become irrelevant"* (Case & Shiller, 2003, p. 327). Buyers are willing to purchase homes at a very expensive price only to enter the market before it is too late. Looking into the housing market in Stockholm, we found that on average the closing prices for 2015 are approximately 15% above asking prices (this is based on an average of randomly selected housing units recently sold in Stockholm County in 2015, from the site *Hemnet.se*. So, perhaps Stockholm is experiencing a similar phenomenon. Furthermore, Case & Shiller (2003) asked whether people believe that markets are driven by psychology. Their results found that: "… people generally do not believe that markets are driven primarily by psychology, even in a booming real estate market" and "… most homeowners do not perceive themselves to be in a bubble even at the height of a bubble" (Case & Shiller, 2003, p. 327). It seems householders believe that their high expectations are warranted and based on fundamentals, which only exacerbates the possibility of a housing bubble as they are not aware of the bubble. It is merely hypothesis, but this may very well be the case for Stockholm as well since there seems to be hubris of buying now, as closing prices are consistently above asking prices due to bidding wars.

To illustrate what the expectations are on future housing prices are in Stockholm we make use of the *Boprisindikator*, which can directly be translated as a "housing price indicator". The indicator measures the difference of how many households expect the housing prices to increase the coming month in relation to households that believe prices will decrease.

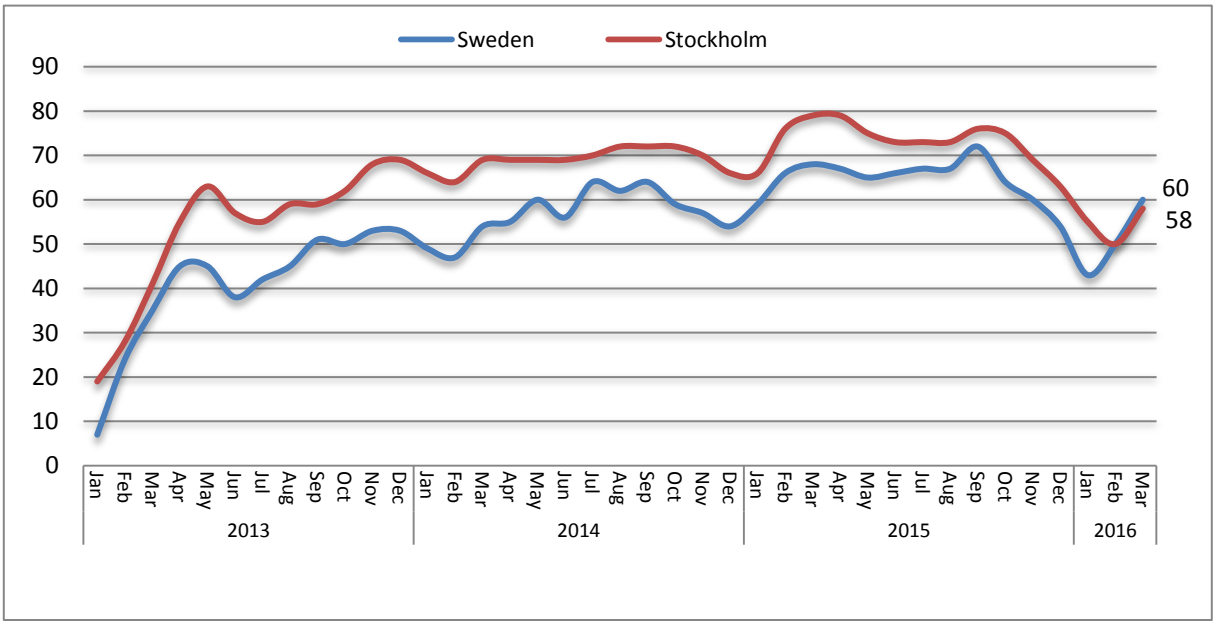
Graph 9. Housing price indicator



Source: Mynewsdesk

Graph 9 shows the housing price indicator in Sweden, 2003-2016. Values are given in percent. A value of 0 means that an equal number of households believe housing prices will go up during the next month in relation to households that believe housing prices will go down. All positive values (>0) mean a higher portion of households believe prices will go up, and vice versa.

Graph 10. Housing price indicator in Stockholm and Sweden



Source: Mynewsdesk; and own calculations

Definitions as in graph 9.

Note that graph 9 is a housing price indicator for Sweden and data is available since 2003. For expectations in Stockholm we have only been able to obtain data since January 2013, shown in graph 10. The housing price indicator in graph 9 shows that expectations on future housing prices are correlated with the recent trend of housing prices. For instance, during the financial crisis, housing prices were falling, and thus there is a big fall in the future price expectations. Similarly, housing prices decreased during a brief time in 2011, which was, once again, followed by a fall in expectations.

In February 2015, the housing price indicator portrayed a new record in both Sweden (66%) and Stockholm (76%). Since February 2015, expectations have been quite steady for Sweden until September 2015, where it hit a new all-time high at 72%, and Stockholm has remained steady at around 75%. The expectations in Sweden and Stockholm fell during September 2015 to February 2016. This was during a time when there have been many debates and discussions in media about the housing prices in Sweden, where many warn that we may be in a housing bubble. There are also many suggestions regarding new regulations that need to be put into place to prevent further increases in prices. We believe this has most likely caught the attention of homeowners and potential buyers, which can explain the decrease in during this time period. Even though the debates of bubbles are still ongoing, the initial shock from the mentioning of a bubble seems to have subsided, which may explain why expectations are again on the rise.

During the past three years the expectations have been approximately 11% higher in Stockholm than Sweden. Given that the housing prices have increased at a quicker rate in Stockholm than the rest of Sweden (where nominal prices are much higher), and that expectations are extrapolative (i.e. inhabitants in Stockholm will look at previous housing prices in Stockholm only), we will draw the assumption that expectations have been steadily higher (during times of price appreciation) in Stockholm than in Sweden since 2003. Perhaps high expectations in Stockholm have been formed from stubborn belief in order to justify expensive purchase of housing. For instance: "Prices *must* go up, otherwise this will not be a sound investment". It is unfortunate that there is no data for Stockholm

in comparison to Sweden during negative values of expectations (for instance between years 2008-2009). However, we know from reviewing the price development that Stockholm prices tend to fall faster than for Sweden during depreciations. If expectations are truly extrapolative we would then expect expectations to be even lower in Stockholm than in Sweden.

By determining whether expectations are higher or lower than previous years, we can deduce the potential impact this has on demand. Prior to 2013, expectations have been quite volatile, with significant dips in 2008 and 2011. Since 2013 to 2015 expectations have been steadily high, hitting all-time highs in 2015. This suggests that demand for housing has been higher in the few recent years compared to previous years, as more people expect they will realize capital gains if they were to purchase now rather than in the future. Perhaps this has contributed to the astonishing rate of increasing housing prices since 2013, and especially so during 2015 in Stockholm.

It is also possible that expectations on housing prices have an impact on supply. This is mainly due to the capital gains tax of 22% in Sweden (review Section: 5.1.4). Under the assumption that expectations of increasing prices are high, this gives incentives for homeowners to not sell their home. It is a better option to keep their home, believing that they will receive an increasing capital gain in the future than to sell now (and paying a tax of 22%). Vice versa is also true - if a homeowner expects prices to fall then their best option is to sell now and reap their maximum capital gain.

Until now we have only discussed how expectations impact homeowners, or potential homebuyers who buy with the intention of living in the home. However, with high expectations also comes the risk of speculation. There are many sources claiming that speculation occurs in Stockholm. KTH professor Stellan Lundström claims that the past few years of price surges in Stockholm can largely be attributed to speculation (Spängs & Lucas, 2015, Oct. 14). Speculators buy housing units that are under construction, never having the intention to move in, but to sell as soon as the construction is complete. They speculate that they will be able to sell the completed unit at a more expensive price. Even more concerning is that the construction company JM believes that two thirds of all new apartments are bought due to speculation, without the intention of moving in (Wilderäng, 2015, May. 23). Financial analyst Peter Malmqvist mentions there is "hysteria" in the housing market in Stockholm which has caused further speculation, and investors even own double households (Spängs

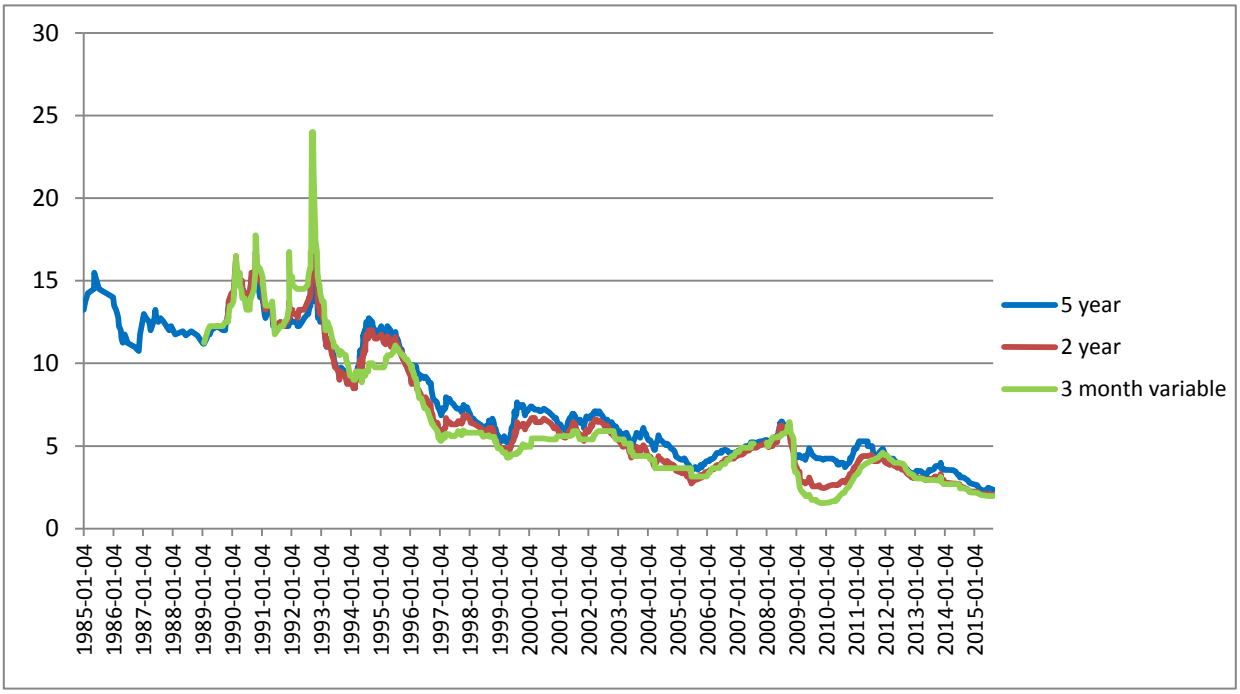
& Lucas, 2015, Oct. 14). Malmqvist further claims that due to speculation, a drastic fall in housing prices is inevitable in the near future. *Sverige's Radio* describe a new phenomenon in Stockholm – speculators purchase apartments with the intention of renting out second-hand, in order to make a profit (Burgerfeldt, 2015, Feb. 4). The effect of this intense speculation is a tightening of supply, and increase in demand. It is difficult to determine to what extent this has contributed to appreciating prices, but all sources claim it has had a substantial effect.

To sum up, the data from the housing price indicator for expectations in Stockholm cannot determine whether expectations are unreasonable. On the other hand, it does seem that expectations move in parallel with the housing prices in the market. These are however short-term expectations. From 2013-2015 expectations have been at some instances at record levels, and housing prices have been moving in relation to this. Expectations did decrease quite drastically during September 2015 to February 2016. This was probably due to uncertainty in the market as there have been warnings of a bubble, and house prices were showing signs of stagnating. This uncertainty seems to have been short-lived. The signs that *do* indicate that expectations may be unreasonable are: Closing prices that are 15% above asking prices, there seems to be hubris for buying, and the vast amount of speculation that occurs in Stockholm.

5.3 Mortgage Rates

The capital costs homeowners and potential housing buyers face depends significantly on the interest rates on the housing mortgages since most homeowners and housing buyers use mortgages to finance a housing purchase (Englund, 2011). Mortgage rates determine the costs for a mortgage loan and thus directly affect housing buyers that can obtain credit in terms of mortgage loans. Collective studies have consistently shown that mortgage rate is one of the major driving factors of housing price developments, and is an essential part in the user cost of housing framework.

Graph 11. Nominal mortgage rates



Source: Swedbank; and own calculations

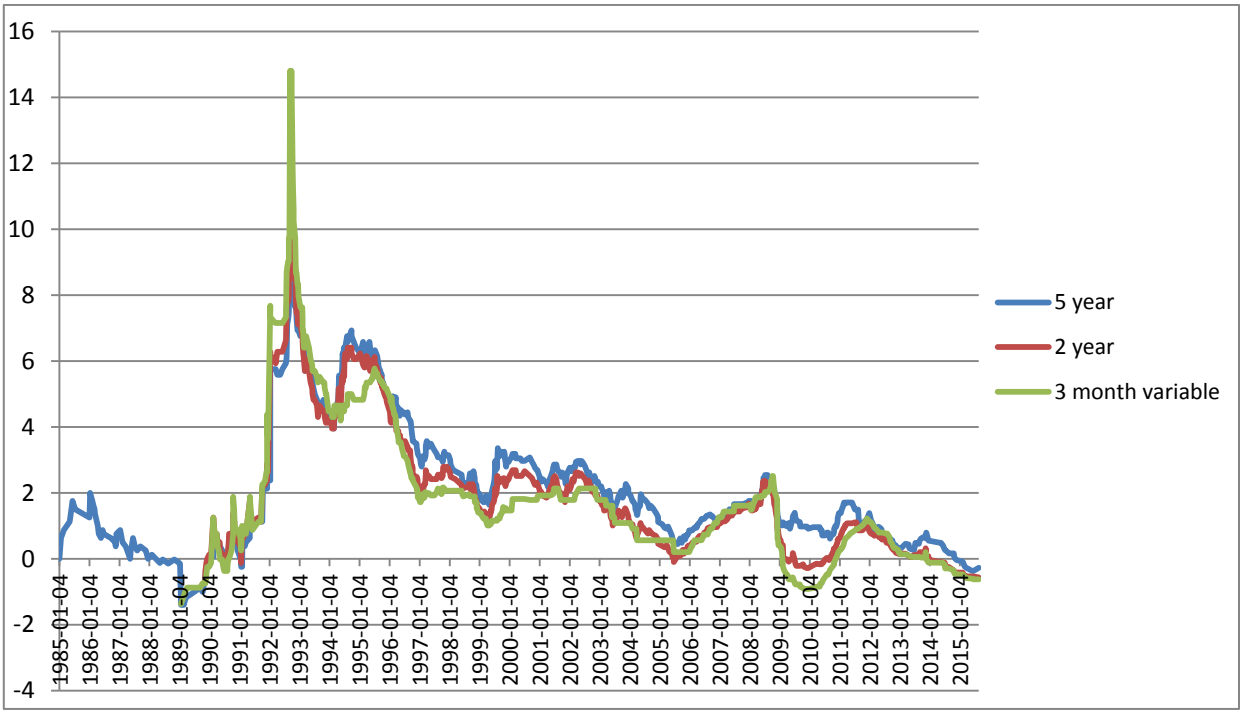
Graph 11 shows the current nominal mortgage rates provided by Swedbank, one of the big four banks in Sweden, between years 1985-2015. Swedbank is the only bank with available mortgage rates spanning 30 years back, which is why this data has been chosen. We believe it to be a sufficient proxy for collective mortgage rates as the major banks have had historically similar rates. Values are given for 3 month variable rate, 2 year fixed, and 5 year fixed mortgage rates. Note that these rates were the official current rates for the corresponding time periods; whereas the realized mortgage rates (the rates at which borrowers actually received their mortgage loans) may have differed slightly, depending on individual factors (e.g. value of house, size of the loan, income). For instance, the current official mortgage rate for 3 months variable rate and 5 year fixed is 1.97% and 2.35%, but the current realized average mortgage rate is 1.51% and 2.05% respectively. I.e. we estimate an error margin of approximately +-0.5%.

During the Swedish banking crisis (1990-1994) mortgage rates were very volatile and at a high level, where the 3 month variable rate was on average *higher* than the 2 year and 5 year fixed rates. In late

1992, the 3 month variable rate peaked (very briefly) at 24%. Following 1995, mortgage rates gradually decreased until mid-2005, when they started rising again. As the global financial crisis hit in 2008, we see that mortgage rates decreased rapidly; arguably a strategy to mitigate the effect of the crisis. This was followed by a slight increase from the beginning of 2010 until mid-2012, and has since then decreased to record low levels. The 3 month variable rate is today similar to its lowest point in the beginning of 2010, whereas the 2 year and 5 year fixed rate has never been lower.

Literature claims that the key component to measure the user cost of housing is the real after-tax interest rate, which reflects the real capital costs of financing a home (Englund, 2011). To adjust nominal mortgage rates to real after-tax mortgage rates one must include *expected* inflation and tax deductibility on interest.

Graph 12. Real after-tax mortgage rate



Source: Englund, 2011, p. 57; and own calculations

Graph 12 shows the real after-tax mortgage rate between years 1985-2015. Values are given for 3 month variable rate, 2 year fixed, and 5 year fixed mortgage rates. According to Englund (2011) real after-tax mortgage rate is defined as m(1-t) - π, *where* m *is the nominal mortgage rate,* t *is the tax*

rate applicable for interest deductions and π is the expected inflation. In 1990-1991 there was a tax reformation in Sweden, adjusting the tax deductibility from 50% to 30% (Government Offices of Sweden, 1997:98:1). The data has therefore assumed a flat tax deductibility of 50% before January 1992, and 30% after. In late 1992 the Swedish Central Bank was forced to change the fixed exchange rate to a floating rate (Swedish Central Bank, 1993). Simultaneously they set an inflation target around 2%. Englund (2011) has also anchored the expected inflation rate at approximately 2% after 1992, so we have done the same. Prior to 1992 there was no official inflation target, so we will be using Englund's (2011) expected inflation rate based on survey data for years 1985-1992. During this time expected inflation rate was around 5-7%. These numbers are estimates which may contribute to an error margin.

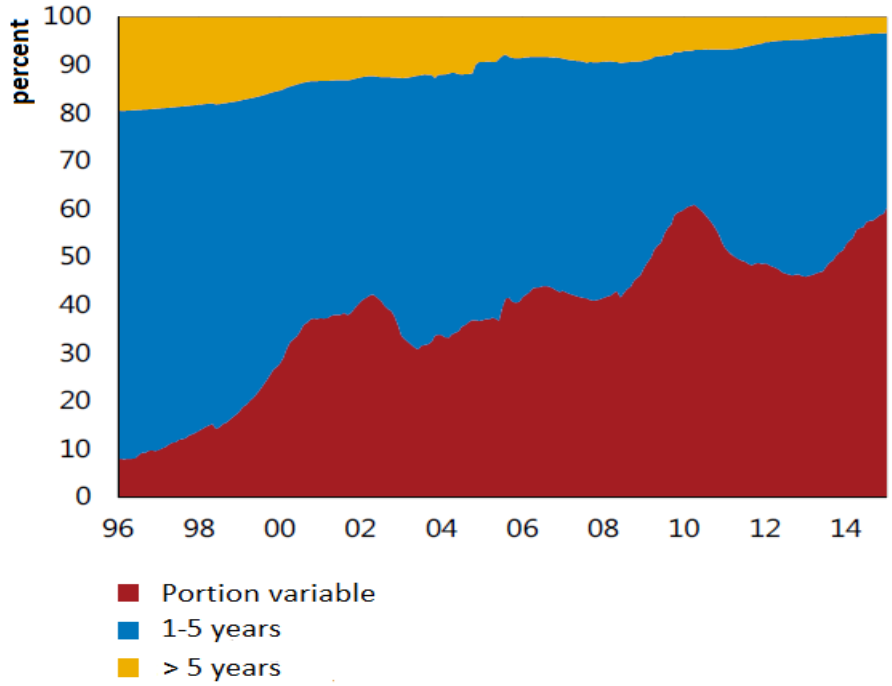
Notice the significant difference between graph 11 and graph 12 during the years 1985-1992. The reason is the high expected inflation rate and a tax deductibility of 50%. The real after-tax interest rate was therefore close to zero, and even negative in 1989. This may explain the room for increasing housing prices until 1990 (before the banking crisis), despite the high nominal mortgage rates. After the tax reformation in 1991, expected inflation decreased quickly, and at the same time interest deductibility was changed to 30%. The result was a huge increase in real after-tax interest rates in early 1992 to 1993. During this time Sweden experienced a decrease in housing prices. Although, it is difficult to conclude whether the decrease in housing prices was an effect of rising real rates, or the effect of the Swedish banking crisis. Following 1994, there has been a gradual decrease of real after-tax rate, and during this time housing prices have consistently increased.

Today the real after-tax rates are negative. Since the 1990s, this has only occurred once before, which was briefly in 2010. However, this was only for the shorter maturities, the longer maturities are today lower than they were in 2010. One must go back to the 1980s (prior to the banking crisis) to witness negative real after-tax rates for longer maturities (during this time the tax effect on interest deductibility was 50% instead of 30%, and expected inflation was high, which drove real after-tax rates down). The negative real after-tax interest rate today is a consequence of the historically low nominal rates, rather than an effect of tax deductibility and inflation.

There are two points during the last 20 years when real after-tax rates have increased: 2006-2008 and 2011-2012. Similarly, there have been two points when housing prices have decreased - 2008-2009 and 2011-2012. As nominal interest rates have reached the lowest level of all time, and the real after-tax is for longer maturities are negative for the first time in 25 years, housing prices have risen in a vast pace to record high levels that has never before been witnessed. Given the data, there seems to be an undeniable correlation between decreasing real after-tax rate and increasing housing prices.

Since the Swedish banking crisis, which ended in 1994, the 3 month variable real rate has always been lower than the fixed rates, so households that have chosen variable rates have faced lower borrowing costs for the past 20 years. Therefore we find it interesting to look at the trend of household mortgages that have chosen shorter maturities over long maturities.

Graph 13. Mortgage loans divided into different maturities



Source: Swedish Central Bank, 2015, p. 36

Graph 13 shows all mortgage loans for all homeowners in Sweden, divided into portions of binding periods (maturities) between years 1996-2015. The portions are given for variable rates, 1-5 year fixed rates, and >5 year fixed rate. Data is unavailable before 1996.

In 1996, we can see that a large portion (~20%) chose binding periods of over 5 years (graph 13). At the same time those that chose variable rates was very low (~8%). This is not surprising, as Sweden had recently experienced a banking crisis, and nominal rates as well as inflation had been extremely volatile (at one point variable rate was higher than the 5 year fixed rate, and inflation fluctuated between 4-11%). Since then the trend has been consistent, showing that mortgage borrowers have gone from longer maturities to shorter maturities. In year 2000-2002 there was a small peak of the portion choosing variable rates. Most likely this is a combination of gaining confidence in the banks, as well as decreasing mortgage rates, as variable rates had then been consistently lower than fixed for several years. Until 2008, the portion of variable rates was fairly constant, and after the financial crisis hit, there is another sudden jump between years 2009-2010. One reason may be that the mortgage rates were lowered significantly during this time, where variable rates became significantly lower than the fixed rates. In 2011, mortgage rates once again increased, where variable increased at a faster rate than fixed, which may explain the decrease in the proportion of mortgage loans with variable rates.

Today, the portion of variable rates is very high, where approximately 60% of all mortgage loans in Sweden have very short binding periods. For new mortgage loans, the portion of variable rates is 76% (Swedish Central Bank, 2015). As we showed previously, homeowners that have chosen variable rates over fixed rates during the past 20 years have faced lower borrowing costs, and as a result, more homeowners have chosen shorter maturities. So, the data suggests a strong negative correlation between mortgage rates and maturities (lower mortgage rates result in more borrowers choosing variable rates, and vice versa). As mortgage rates are now at an all-time low, there is a large portion of homeowners with mortgage loans (especially new mortgage borrowers) that are sensitive to mortgage rate fluctuations as more homeowners have chosen variable rates. This suggests that recent homebuyers are willing to take on additional risk, in the form of being vulnerable to mortgage rate fluctuations, to cheaply finance their home purchases, during times of low mortgage rates. Thus, recent home buyers are able to "afford" more expensive housing due to low variable rates. But we have seen that when interest rates rise (in combination with falling housing prices), the tendency is to move towards longer binding periods, perhaps to protect oneself from further increase in interest rates, making the mortgage rate payments even more expensive in the short run during increasing mortgage rates.

5.3.1 The Cost of Capital and Demand for Mortgages

The costs for mortgages make up a significant part of the total costs mortgage borrowers have, and thus have a major impact on their cost of capital. The decreasing mortgage rates have made it cheaper to take out new mortgages and as a result, the cost of capital for new loans is at a historically low level. With declining real mortgage rates, existing mortgage borrowers that rely on variable mortgage rates lower their mortgage payments. Existing mortgage borrowers that rely on longer fixed rates may also be able to refinance their mortgage loan cheaper when it is time for refinancing. With a declining mortgage rate environment, potential mortgage borrowers can persistently obtain cheaper cost of capital than previous homebuyers. The lower borrowing costs should increase the demand for mortgages but the cheaper costs to finance mortgages may not only increase the demand for mortgages, but also increase potential mortgage borrowers' willingness and ability to take on larger mortgages. An increased demand of mortgage loans naturally leads to increased demand of housing (as more people can afford mortgage payments on a home), contributing to the increasing of housing prices.

Since the housing price development is dependent on recent sales, it is important to note that new housing buyers continuously have been able to obtain cheaper financing than the previous housing buyers. Hence, it is important to see the link that the lowest borrowing costs and the highest housing prices occur at the same time. Finally, it seems highly unlikely that the mortgage rates can fall much lower than they currently are because banks will then take on too much risk in relation to the mortgage loans.

5.4 A Simplified User Cost of Housing Model

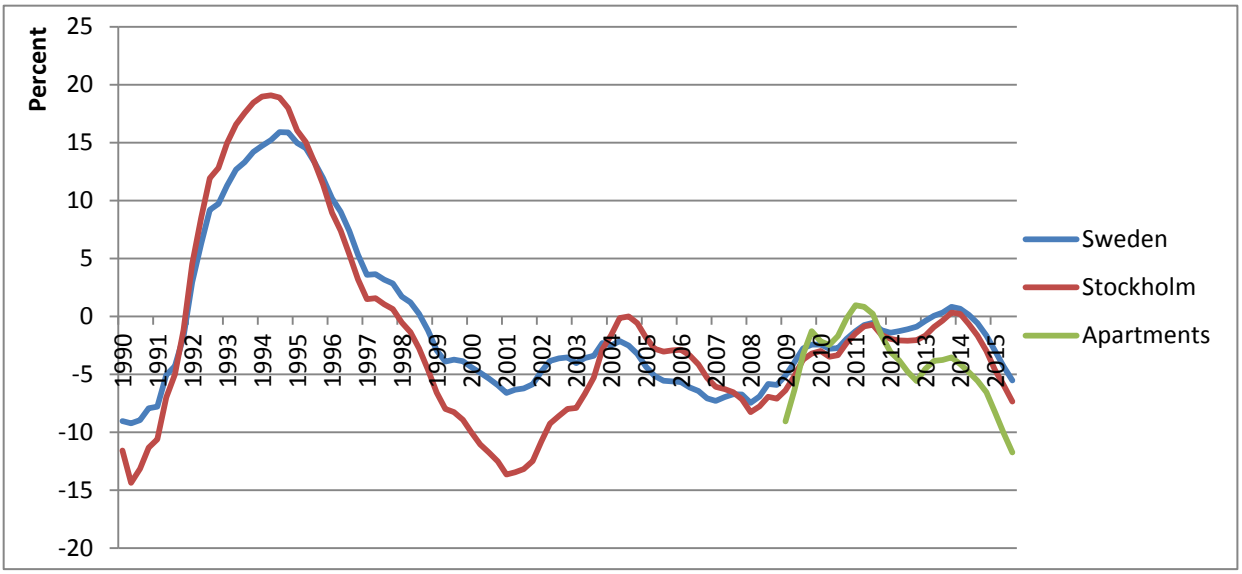
By combining the three components of real estate taxation, expectations on future housing prices, and mortgage rates, we are able to provide an estimate of the user cost of housing over time. However, this is only a simplified version of the real user cost as we have not taken all factors of what constitutes the real user cost into account. When calculating the model, costs are given a positive notation (user cost increases), and gains are given a negative notation (user cost decreases) (Gallin, 2003). Gallin (2003) did a simplified version of user cost by only using mortgage rates and expected capital gain. To estimate expected capital gains, the author used the average growth rate of the house price index over

the last three years. Therefore, we will similarly use the three year average real growth in the house price index for Stockholm and Sweden. For mortgage rates we will make use of the 5 year fixed real after-tax rate which has taken interest deductions and expected inflations into account, to reflect the real cost of mortgage payments. We will also include real estate taxes, for which before 2008 we use a fixed unit of 0.75% (assessed value of a house is 75% of the market value, and the property tax was 1% of the assessed value). After 2008, the municipal property tax is so small that it is more or less negligible, so we give it a zero value.

In our user cost formula, the user cost depends on the price of housing, *P;* the nominal mortgage rate, *m;* the tax rate applicable for interest deductions, *t;* property tax, *0.75%;* expected inflation, π*;* and expected capital gain, *CG*.

$$UC = P[(m(1-t)-\pi) + 0.75\% - CG]$$

Graph 14. User cost of housing



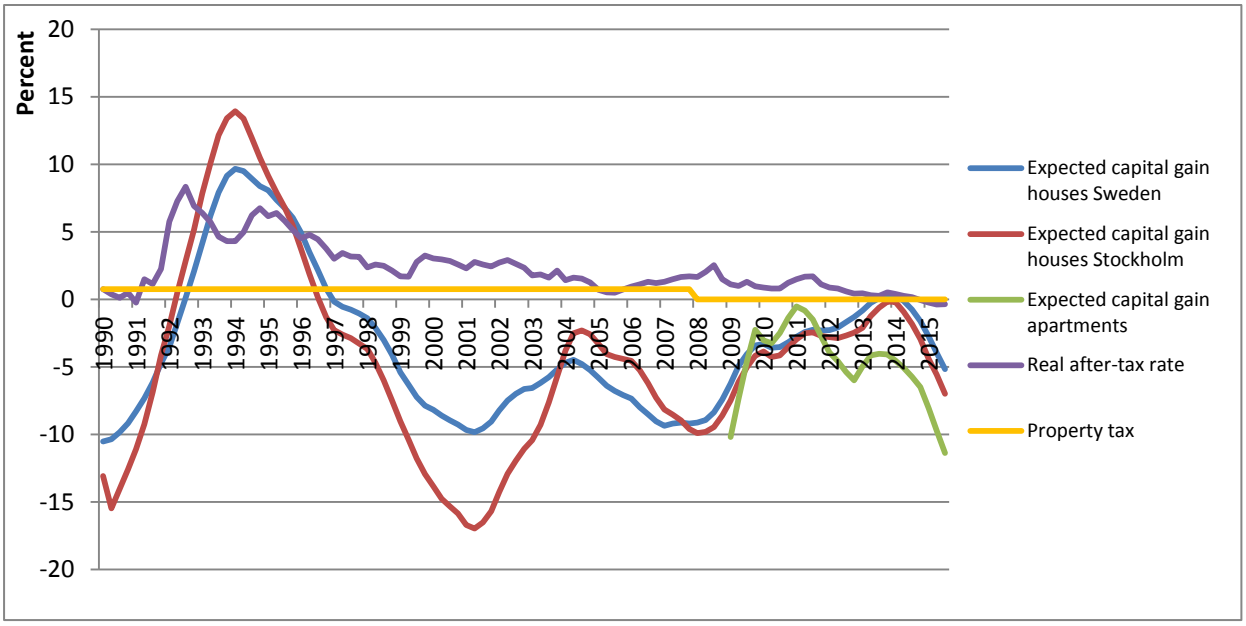
Source: Own calculations.

Graph 14 shows the (simplified) user cost of houses in Stockholm and Sweden between years 1990-2015, and for apartments between years 2009-2015. The user cost values are given in percent for any value of P (price of housing).

The user cost impact of mortgage rates has assumed a loan of 100% of the value of the housing, but there are requirements for equity investments in order to attain a loan (LTV ratio of 85%). Thus, there is an opportunity cost of equity that is missing in the user cost model, which is the opportunity cost of saving the invested money in a bank. However, the impact of the missing opportunity cost of saving is rather small as interest rates (rate for saving) and mortgage rate follows closely. The difference is that savings are not tax deducted.

The period between years 1992-1998 showed positive user costs in Stockholm, with a peak of 19% in 1994. Since 1998, user cost of houses in Stockholm has been negative for the entire span until 2015, only reaching values of close to zero at two occasions, in 2004 and 2014. For apartments, user cost has been negative during 2009-2015, except for being briefly positive in 2011. It is unfortunate that we do not have a longer time series for apartments to illustrate its user costs. Although, the small time span that we do show have a user cost even lower than that of houses. This is due to higher capital gains between years 2005-2015 for apartments than for houses, which has generated a higher estimated expected capital gain and thereby a lower user cost.

Graph 15. User cost of housing divided into components



Source: Own calculations.

Graph 15 illustrates the user cost divided into its respective components for both Sweden and Stockholm, showing the weight of each factors and its effect on user cost, years 1990-2015.

Graph 15 gives us a better overview of the impact of the different factors on the user cost of housing. It becomes clear that expected capital gain is the factor that has the most substantial impact on user cost. This is not surprising given the price development over the last 20 years. Although real after-tax rate has been declining (purple line), it has little effect in comparison to expected capital gains (red, blue, and green lines). Property tax has had a very small impact (orange line).

As we know, the user cost framework is intended to compare the costs for rental of housing to ownership of housing, in order to determine whether it is more favorable to rent or favorable to own. Although we do not provide figures for the cost of rentals, the costs for renting is always positive since the renter pays a monthly fee for the right to live in the home, without reaping any benefits of capital gains. Since user cost of housing for ownership has been negative since 1997, and renting has a positive cost, we conclude that it has been more favorable to own than rent for almost 20 years in Stockholm.

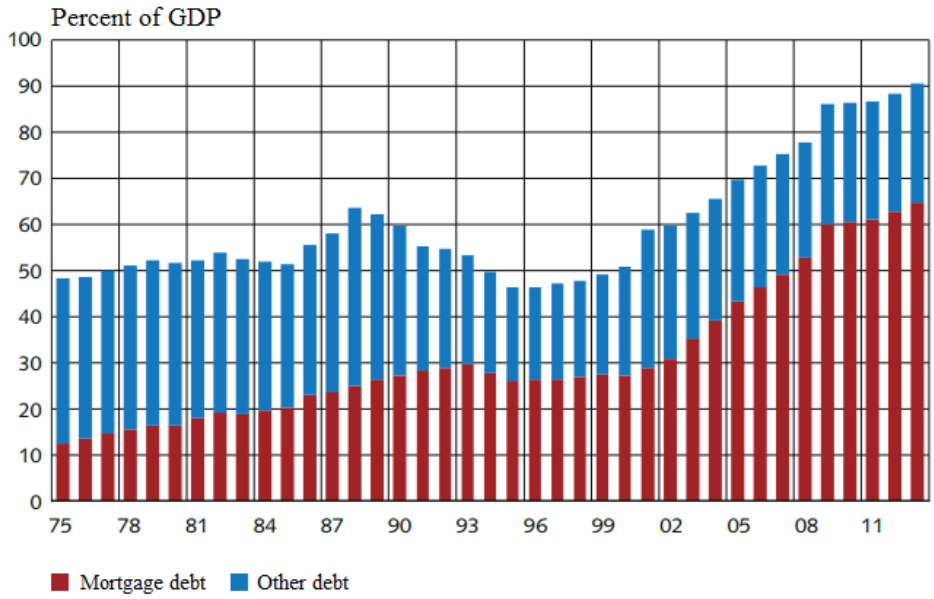
6. Credit Market Developments

As credit is an important factor for the housing prices, the development of the mortgage market is important for the availability and terms to obtain credit. It is therefore important to review how the Swedish mortgage market has changed over time and how this may have affected the growth in mortgage related credit, and the impact it may have on the housing prices in the current market. In this section we review the credit market development in the following parts: (1) How the Swedish mortgage market has developed and the growing mortgage debt in relation to GDP. (2) The intention to slow down the mortgage related credit growth by introducing a maximum LTV ratio. (3) Factors that may contribute to rising mortgage debt (4) The features of Swedish mortgage contracts (5) The intention to implement amortization requirements on new mortgage loans (6) How the amortization requirement would affect a potential housing buyer (7) How the housing market in Stockholm was affected by the suggested amortization requirement in March 2015. In a separate section we review the development of mortgage debt in relation to disposable income in Stockholm.

6.1 The Development of the Swedish Mortgage Market

The Swedish credit market was strictly regulated until the mid-80s (Englund, 2015). The deregulation meant that mortgage loans that earlier had been scarce became available as the banks themselves could decide to whom and for what purposes they wanted to lend (Swedish Central Bank, 2014). This led to an intensified competition between banks and credit institutes in Sweden to provide mortgages, which narrowed the margin between the lenders' funding costs and the mortgage rates (i.e. mortgage rates decreased) (Englund, 2015). Mortgage borrowers had generally been required to amortize their mortgages during a certain time period. However, in the early 2000s, amortization-free mortgage loans and lower down payments became available (Swedish Central Bank, 2014). In general, lower down payments and amortization-free mortgage loans meant that more people became less credit constrained. As a consequence of the new conditions for mortgage loans, more households were able to take out larger mortgage loans for housing purchases.

Chart 1. Household debt in relation to Gross Domestic Product (GDP)



Source: Swedish Central Bank, 2014, p. 10

Chart 1 shows mortgage debt, and other household debt, in relation to GDP in Sweden from 1975-2012.

As we can see from the chart above, the mortgage debts in relation to GDP in Sweden started to increase significantly in the early 2000s, which seems to be related to the introduction of amortization-free loans and rising housing prices.

6.1.1 Introducing a New Maximum Loan-to-Value Ratio

To reduce the development in the mortgage related credit growth and prevent unsound lending practices, the Swedish Financial Supervisory Authority, *Finansinspektionen* (from now on FI), introduced a mortgage ceiling on the 1st of October 2010 (Finansinspektionen, 2012). The mortgage ceiling stated that new loan collateralized by a home may not exceed 85 per cent of the market value of the home. The intention of the mortgage ceiling was to hinder banks to lend out for the whole purchase amount and to reduce the increasing loan-to-value (LTV) ratios (Finansinspektionen, 2012). In an interview with the newspaper *Telegraph* in 2014, the former head of the FI, Martin Andersson says: "We introduced a cap on 85% LTV on mortgages in 2010 because we saw that banks were lending out with very high LTV ratios – almost up to 100% for new mortgages in some cases" (Chan,

2014, Jun. 21). Following the introduction of the 85% LTV ceiling, a somewhat slower increase in mortgage debt in relation to the GDP can be seen in the chart 1. However, despite the introduction of the mortgage ceiling with the LTV ratio of 85% for new mortgage loans has the Swedish mortgage debts continued to increase.

6.1.2 Factors That May Contribute to the Rising Mortgage Debts

There are reasonably many factors that contribute to the expansion of mortgage debts after 2010. Due to the declining mortgage rates, the demand for housing mortgages has increased. At the same time the housing prices continued to increase, which generally implies that a larger mortgage loan is required. Another contributing reason for the continued increasing mortgage lending may be that the LTV ratio of 85% introduced in 2010 only appears to be a general guideline for banks' lending practices. For instance can the down payment be covered with the use of Blanco-loans, a loan without security or collateral (Finansinspektionen, 2015). In addition, the LTV ratio of 85% may be relatively high which has allowed housing buyers to purchase housing for large amounts but only conducting a down payment of 15%. According to the International Monetary Fund (2014) is the mortgage ceiling of 85% in Sweden relatively high in comparison to other countries where LTV ratios of around 75% are prevailing.

Another contributing reason for the growth in mortgage debt in relation to GDP may be that households can take out additional mortgages on their housing if the housing prices in general increase due to improved perceived collateral. The National Board for Housing, Building and Planning (2010) has for instance argued that Swedish households have used the increasing housing prices as a "cash machine" through negative amortization loans. When the housing prices have increased, homeowners have been able to obtain a revaluation of the housing. With a higher valuation, due to the rising housing prices, can homeowners take out additional mortgages with the housing as collateral and thereby increase their mortgage debts.

While it is worth noting that mortgage borrowers today often do amortize, the amortization pace in Sweden is extremely low on an aggregate level and not yet strictly regulated. According to a study conducted by Winstrand & Ölster (2014) at the Swedish Central Bank, 24 percent of homeowners with mortgage debts in Sweden increased their debts between July 2012 and July 2013, while 16

percent had unchanged mortgage debts during the period. Winstrand & Ölster (2014) show that 60 percent decreased their mortgage debts with a pace that would require on average 99 years for them to become debt free. Similar studies, based on samples of mortgage borrowers from the eight largest mortgage providers in Sweden, indicate that those that amortize on their bottom loans require an amortization time of more than 140 years (Finansinspektionen, 2013). While comprehensive data on the amortization pace at micro-level is unobtainable, it is commonly considered that the amortization culture in Sweden needs considerable improvement (Bränström, & Hellekant, 2014, Oct. 7). This may be a major driver behind the mortgage debt development on an aggregate level in Sweden, and for the relatively high indebtedness among some homeowners (especially in Stockholm) (Section 6.2 reviews Stockholm's household debt in more detail). To curb the bad amortization culture has FI for some time intended to implement amortization requirements on new mortgage loans. In order to understand why FI intends to implement amortization requirements on new mortgage loans, and why amortization requirements may be important to housing buyers and the housing prices, we will first review the features of Swedish mortgage contracts.

6.1.3 The Features of Swedish Mortgage Contracts

In the current market, households that intend to purchase a house or apartment in general need to have 15% of the purchase amount for the down payment. As a result, households can normally borrow 85% of the purchase price of the housing by taking out a housing mortgage (Hull, 2015). In this regard has there been a tightening of credit since 2010, due to the introduction of the LTV ceiling. Hull (2015) reviews the characteristics of Swedish mortgage loans in detail. The Swedish mortgage contract typically entails two components, a bottom loan and a top loan. The bottom loan is the larger share of the mortgage and usually accounts for around 70% of the property's value. The top loan on the other hand constitutes the additional mortgage loan that borrowers take out to cover the difference between the value of the housing, the bottom loan and the down payment (Hull, 2015). The top loan needs to be fully amortized over some pre-specified time. At the origination of the mortgage contract, borrowers are given a grace period on the bottom loan, which allow them to defer amortizations forever (Hull, 2015). As a result, the Swedish-style mortgage contracts do not require full amortization. Instead, Swedish mortgages require the mortgage borrower to amortize until a pre-specified LTV threshold is reached and can voluntarily amortize thereafter. As Hull (2015) points out,

Swedish households can hence avoid amortizing completely after the threshold is reached. In addition, Swedish households may refinance in order to extract equity up to the LTV threshold without triggering required amortizations. As a result, Hull (2015) resembles the current structure of a Swedish mortgage loans to an interest only mortgage loan with temporary amortizations at the origination, and voluntary amortizations thereafter on the bottom loan. As the value of the housing (or the purchase price) typically make up the collateral value for the bottom loan, bottom loans typically bears a lower interest rate than the top loan (Hull, 2015). In this regard it can be attractive for borrowers to demand a revaluation of the housing to improve the collateral. In a housing market where the housing prices increase rapidly, the higher perceived housing value may induce homeowners to ask for a revaluation of the housing to claim a larger collateral value against the mortgage loan, in order to lower the interest rates on the mortgage loan. A revaluation of the housing, that indicates a higher value of the housing, can thus lower the interest rates on the mortgage loan but may also affect the LTV threshold that impacts the amortization requirement on the top loan, as households only need to amortize down to a 70% LTV ratio (Hull, 2015). In this regard it is possible to claim a revaluation of the housing to the point where amortizations no longer need to be conducted as a consequence of the rising housing prices.

6.1.4 The Intention to Implement Amortization Requirements on New Mortgage Loans

On the 11th of March 2015, FI issued a press release that would affect future mortgage borrowers and hence potential housing buyers. The press release called "Amortization requirement for new mortgage loans", was intended to be implemented on the 1st of August 2015 ("Amortization requirement", 2015, Mar. 11) According to FI's suggestions would the amortization requirement imply that all new mortgage loans obtained on the 1st of August 2015 and thereafter need to be amortized down to a 50% loan to value ratio. The annual amortization pace needs to be a minimum of 2% on the entire mortgage loans with LTV ratios above 70%, until the 70% LTV ratio is reached. Thereafter, the annual amortization is suggested to be 1% on the entire mortgage loan until the LTV ratio is lowered to 50% ("Amortization requirement", 2015, Mar. 11). FI's press release also suggested that the market value of the housing forms the basis to the LTV calculation but that a revaluation of the housing as collateral only can be conducted every 5 years.

According to FI was the intention with the amortization requirement to increase housing buyer's resistance against disturbances, and lower the risks of the Swedish economy being affected negatively if something unpredicted happens in Sweden or around the world ("Amortization requirement", 2015, 11 Mar.). The suggested amortization requirement was however withdrawn on the 23th of April 2015 due to uncertainties about the legal position. The legal position and the details of the suggested amortization requirement was still not clear as of the beginning of 2016 and remained uncertain until the 20th of April 2016, when FI revealed that the amortization requirement indeed will be implemented on the 1st of June 2016 ("Amortization requirement", 2016, Apr. 20)

6.1.5 The Effect of the Amortization Requirement for a Potential Housing Buyer

The amortization requirement will impact new housing buyers in various ways. One important aspect of the suggested amortization requirement may be that revaluation of the housing only can occur every five years. In this regard, new housing buyers cannot claim a revaluation after a housing price increase and thereby not improve their collateral against the mortgage loan. Housing buyers would have to wait five years for a revaluation to claim improved collateral. Such a hinder impacts new homeowners' ability to claim improved collateral if they expect that the housing prices will continue up, in contrast to how current homeowners can request a revaluation at any given time to improve their mortgage terms. As Hull (2015) points out, the amortization requirement impacts how much debt a household can accumulate but also that it impacts a households' liquidity due to the changes in the monthly amortization payments. In the current housing market with the mortgage rates so low, the proposed amortization requirement would have relatively severe cash flow effects on new housing buyers.

When an amortization requirement eventually is imposed, as it will be on the 1st of June 2016, new housing buyers will be forced to conduct yearly amortizations of 2% per year until the LTV ratio reaches 70%, and 1% thereafter until the LTV reaches 50%. The increased yearly cash outflows that comes with the amortization requirement indicate that new housing buyers will be less willing, and able, to bid up the housing prices after the 1st of June 2016; as they need to service higher amortization payments during a longer time period in contrast to the current conditions were amortizations can be temporary and may be voluntary after a period. With housing prices in

Stockholm as high as today, substantially higher cash outflows during a considerably longer time period indicate that it will become harder to purchase housing at the current price level as the housing related expenses will increase.

6.1.6 The Effect of the Amortization Requirement on the Housing Market

FI's press release regarding the amortization requirements on the 11th of March 2015 seems to have had implications for the housing price development in Stockholm. Real estate agents witnessed an extremely hot housing market in Stockholm during the period when people thought that the new regulations, in terms of an amortization requirement, would be implemented ("Fortsatt prisrally", 2015, Oct. 27; and "Kommentar till", 2015, Apr. 16). People wanted to buy housing before the new regulation would be implemented and extreme bidding wars became normal. The ideas put forth by Sørensen (2013) suggests that amortizations, or rather the ability to avoid the amortization requirements by buying housing before the implementation of the amortization requirement, may have had an important impact on the housing price development by pushing the housing prices upwards during 2015. The bidding wars that have continued throughout 2015 seem to imply that new homeowners value the ability to have slower amortizations than 2% per year, and those new housing buyers are willing to bid up the housing prices further to get their hands on a house or apartment before the new amortization requirement is implemented. Therefore, it is likely that the debate about the amortization requirement have fueled an already hot housing market further.

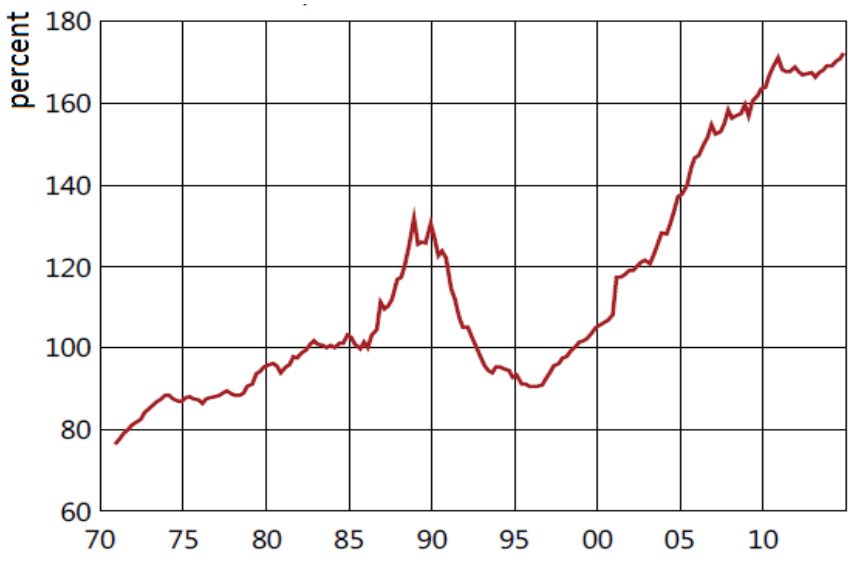
The intense bidding wars that followed the press release indicates that housing buyers may have been willing to pay more for the housing in order to avoid the forced pace of amortization suggested by FI's amortization requirement. Another possibility for the rising housing prices may have been that the ability to take large mortgage loans would diminish if one would have to conduct amortizations for a long period of time. Although the amortization requirement was put on hold, it reasonably affected the housing market due to the uncertainty of when such an amortization requirement would be implemented for new mortgage borrowers in the future. How the amortization requirement will impact the housing market and the housing prices when implemented is still to be seen, but we find it reasonable to expect that the changing credit conditions, that the amortization requirements imply,

should have a reducing effect on credit demand for new housing buyers, and therefore a dampening effect on the housing prices.

6.2 Household Debt and Disposable Income

As we have reviewed, household debt has been increasing in correlation to increasing house prices in Sweden for a long time. However, by taking large amounts of household debt in the form of mortgage loans to purchase a home, households become exposed to various risks. The primary risk for a household is the mortgage rate, since fluctuations of the mortgage rate directly affects their monthly payments (Finansinspektionen, 2015). Therefore, the higher the mortgage loan is in relation to disposable income, the more sensitive the household becomes to an increase in mortgage rates. Because of this, a common measure to analyze households' vulnerability due to an increase in mortgage rates is the *debt ratio* (Finansinspektionen, 2015). This measurement is the relationship between household debt and disposable income (income after taxes are deducted, plus other welfare benefits). For example, a household with loans of 2 million SEK, and a yearly disposable income of 500,000 SEK, has a debt ratio of 400%. So, the higher the debt ratio, the more sensitive a household becomes to fluctuations in mortgage rates, as a larger portion of their disposable income must be used to service the required rates on the mortgage loan (Finansinspektionen, 2015).

Graph 16. Debt ratio of households



Source: Swedish Central Bank, 2015, p. 10

Graph 16 shows the trend for all households' debt ratio in Sweden between years 1970-2014.

The graph shows a drastic decline in the debt ratio between years 1990-1995, during the Swedish banking crisis. Since then the debt ratio has increased at a vast pace, and is now at an all-time high of approximately 170%. This is debt ratio is high in comparison with other countries. However, this graph also includes households that do not have mortgage debt, but other debt that require interest rate payments. For households that *have* mortgage debts the debt ratio is 315% in Sweden (Swedish Central Bank, 2015). The debt ratio trend can mostly be attributed to the significantly increasing trend in housing prices the past two decades (and thereby mortgage debt), which has increased at a quicker rate than disposable income (Review Section 4).

The debt ratio for households with new mortgage loans is much higher. The debt ratio for new mortgage loans in Sweden was, in 2014, 366%. In Stockholm, the debt ratio for new loans is the highest in the country, with an astonishing 482% in 2014 (Swedish Bankers' Association, 2015). The reason for this is that the market value of housing in Stockholm is the highest in Sweden, and buyers are therefore required to take larger mortgage loans (to finance their purchase) in relation to their disposable income. Among the new mortgage borrowers, the younger households (homeowners under 30 years of age) have the highest LTV and debt ratios. This suggests that the homeowners that are exposed to the most risk, are the most recent home buyers, and even more so for young buyers.

Another measurement of household vulnerability is the *interest ratio*, which is a similar tool to debt ratio (Finansinspektionen, 2015). Instead of measuring household debt to disposable income, the monthly interest payment in relation to disposable income is used. Today the interest ratios are quite low, at 3% with a debt ratio of approximately 180% for Sweden. This means that only 3% of a household's disposable income is used for interest payments. The low interest ratio is a cause of the now historically low interest rates. However, Finansinspektionen (2015) claim that interest rates will increase to more normal rates in the future, which will affect the interest ratios. They tested a stressed scenario where interest rates increased to 8%, and given a debt ratio of 180%; the average interest ratio would increase to 10%. This is under the assumption that households have a variable rate, which is the case in Sweden as there has been an increasing trend of households choosing variable rates over

fixed rates (review Section: 5.3). But the debt ratios for new mortgage loans in Stockholm are at 482%, which is 2.67 times higher than 180%. This would make the interest ratio for recent homebuyers in Stockholm at 26.7% (given that mortgage rates increase to 8%); i.e. 26.7% of their disposable income is used for mortgage payments alone. The Swedish Central Bank (2015) provided an example of a household with 600% debt ratio (which is not uncommon in Stockholm), a mortgage loan of approximately 2 million SEK, a disposable income of 30,000 SEK per month. With today's mortgage rates, the household would have a monthly mortgage rate payment of 2,500 SEK per month after interest rate deductions. A stressed scenario with a mortgage rate of 8% would become 10,000 SEK per month after interest rate deductions, with an interest ratio of 35%.

It is clear that homeowners that have recently purchased their home in Stockholm are vulnerable to mortgage rate fluctuations. If the stressed scenario were to occur, it could lead to financial instability within the economy. For households with a high debt ratio, an increase in the mortgage rates affects them greatly, and paying the required mortgage rates could become problematic. Also, households with a high LTV ratio are sensitive to a fall in housing prices. They risk a situation where their mortgage debt becomes higher than the value of their home in case the housing prices would fall. This could generate higher risk for banks and credit institutions that have provided mortgage loans, as the collateral asset does not cover the outstanding mortgage debt. As the mortgage loans become riskier, a consequence could be an even further increase in mortgage rates. More households would default on mortgage payments and result in credit losses for the financial institutes. A vicious cycle could potentially occur as lending becomes constrained and mortgage rates increase; and with constrained and expensive lending, housing prices would start to plummet.

The economy, on a macro-level, would also become affected of the scenario above. It has been shown that households with high debt ratio would reduce their consumption on other goods if mortgage rate payments become problematic. The Swedish Central Bank (2015) analyzed the consequences of an increasing interest ratio during the Swedish banking crisis between years 1989-1993. The interest ratios increased to 10% during the time, and other consumption decreased drastically. An interest ratio of 10% is not unlikely in Stockholm, with a debt ratio of 482% on new mortgage loans. In fact, a normalized mortgage rate of around 6% (non-stressed scenario) would lead to an interest ratio of far above 10% in Stockholm. A decrease in consumption in the economy can lead to a recession, and

evidence from previous recessions show that a high amount of debt would only exacerbate a recession. International studies also indicate that an interest ratio of 10% increases the risk of a financial crisis (Swedish Central Bank, 2015).

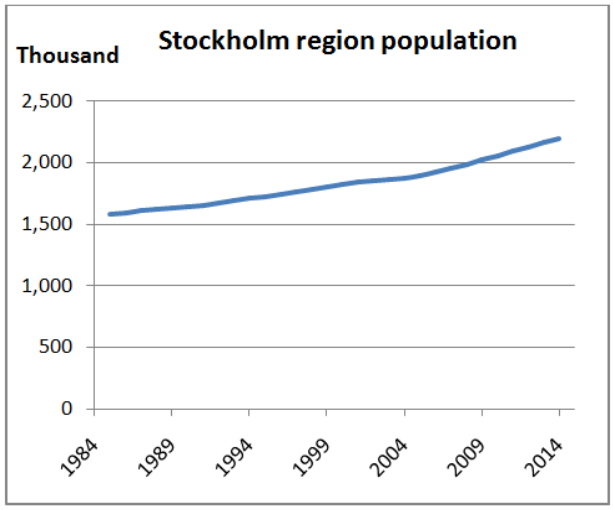
In conclusion, the high debt ratios in Stockholm are concerning. Households are vulnerable to an increase in mortgage rates. Even an increase of mortgage rates to a normalized level of around 6% would make the average interest ratios higher than during the Swedish banking crisis. Loans will become riskier for financial institutions, and consumption within the economy will subside as a consequence.

7. Demographics

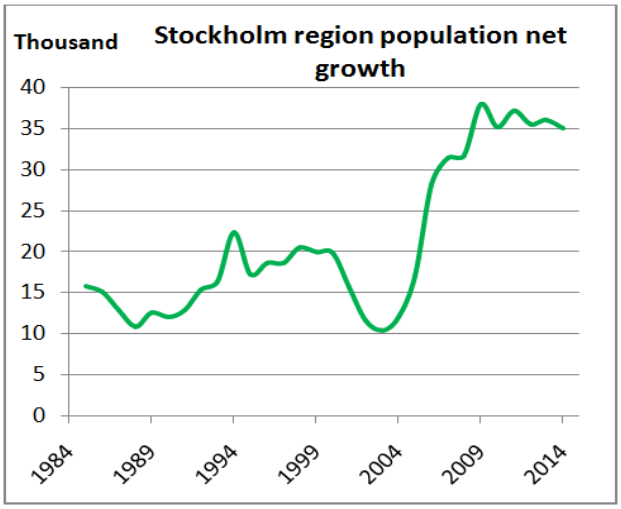
This section will be reviewing the effect of demographics on the housing market in Stockholm. More specifically, we will be looking at population growth, age structure of the population, as well as different categories of individuals that populate Stockholm. By doing this we will discuss the effects on aggregate demand of housing in Stockholm.

Stockholm is Sweden's capital - the cultural, medial, political, and economic center of Sweden. These aspects may have contributed to the popularity of Stockholm, making it the largest city in Sweden. The county of Stockholm has expanded consistently throughout decades, in both population and size (Stockholm Chamber of Commerce, 2014a).

Graph 17. Population in Stockholm



Graph 18. Population growth rate



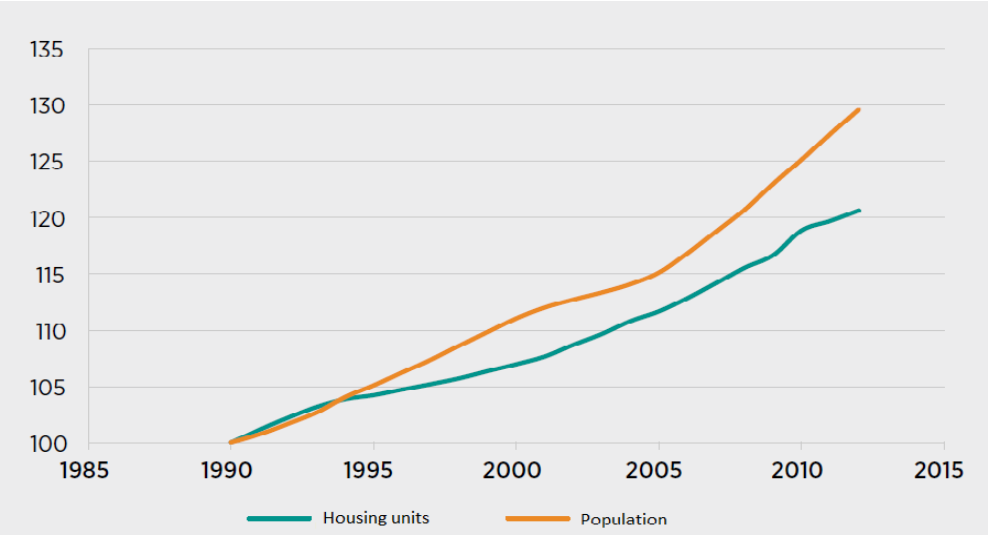
Source: Statistics Sweden; and own calculations

Graph 17 and 18 shows the total population trend, and net population growth in Stockholm between years 1984-2014.

The population growth has been positive every year for the past 30 years, with an average of approximately 21,000 people per year between this time span. Following a small dip in the growth rate around year 2000-2004, the population growth trend has been substantially high the past decade. One must go back as far as the 1960s to find similar population growth rates in Stockholm. The vast

population growth rate in Stockholm is primarily due to immigration (from abroad) and high birth rates. Only ~5% of the population growth is due to urbanization (migration from smaller regions to cities) (Stockholm Chamber of Commerce, 2014a).

Graph 19. Housing units and population



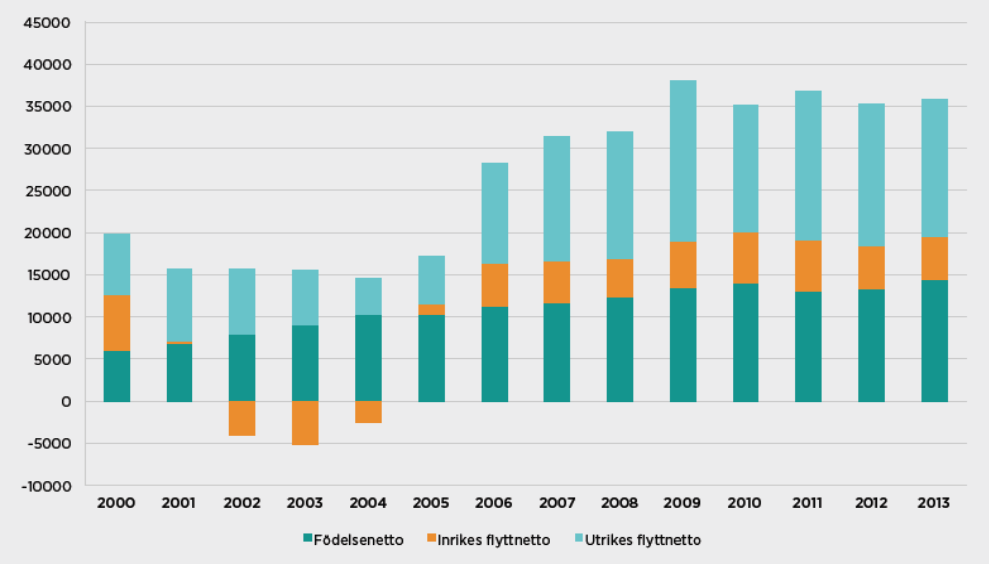
Source: Stockholm Chamber of Commerce, 2014a, p. 15.

Graph 19 the growth of newly constructed housing units (smaller houses and apartments) each year, relative to the population each year, indexed at year 1990.

From the graph above we can see that population has increased at a faster pace than housing units in Stockholm. The gap seems be increasing steadily, and after year 2010 there is a decline in the growth rate of new supply; i.e. there is a decreasing trend in construction of new housing. Stockholm Chamber of Commerce (2014b) shows that in 2014 there was a shortage of 122,000 homes in regards to the population. During the period 2009-2012 the population grew of approximately 146,000 people, whereas during this period only 32,000 new homes were built. Stockholm Chamber of Commerce (2014b) claims that construction of housing needs to increase by a factor of four times to satisfy the increase in population. Given this gap in aggregate demand versus new supply, we can expect the population growth to significantly impact housing prices upwards (we will review supply of new construction in more detail in Section: 8.2.1). However, before we can draw this definite conclusion we need to look at the age structure and the categories of individuals that contribute to the population

growth, as they may have different financial situations. After all, it is partly their ability to receive financing that will determine their purchasing power of housing, and thereby their aggregate effects on the housing demand.

Graph 20. Population growth in Stockholm, divided into categories



Source: Stockholm Chamber of Commerce, 2014a, p. 11.

Graph 20 shows the net migration to Stockholm between years 2000-2013, divided into three categories: net birth rate (light-green), net urbanization (orange), and net foreign immigration (dark-green).

Net birth rate within Stockholm accounts for approximately 46% during this time span, and foreign migration accounts for approximately 43%. Though realistically, the number for foreign immigration is much higher. A large part of foreign immigrations are refugee immigrants who are seeking asylum, and due to the process of how asylum is approved and registered, the population statistics is not entirely true. Not until refugees receive official permit for asylum in Sweden are they included in the statistics (Stockholm Chamber of Commerce, 2014a). Therefore, there are many foreign immigrants who are not included in the statistics. Unfortunately, we do not know the proportion of refugees relative to foreign immigrants who travel to Sweden under normal circumstances from the given data. Having this data would allow us to better determine the purchasing power of immigrants (who

contribute to a large portion of immigration to Stockholm), and thereby deduce their effect on aggregate demand of housing.

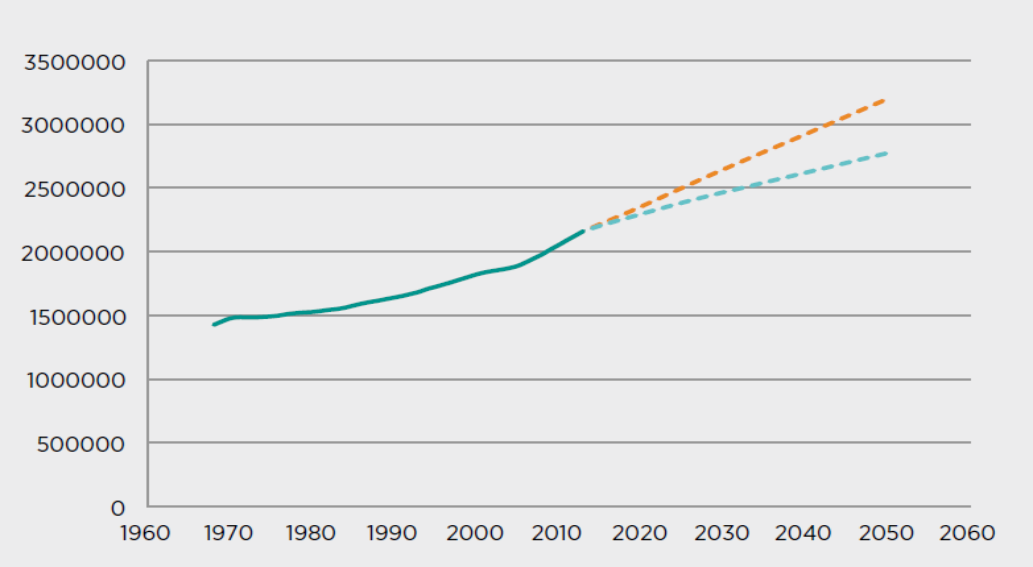
The absolute majority of people moving to Stockholm from other parts of Sweden are in the range of 20-29 years old (Stockholm Chamber of Commerce, 2014a). After the age of 33 more people actually move *out* of Stockholm than *in* to Stockholm. Sørensen (2013) argues that people of different age structures influence the housing demand as they have different preferences in choosing housing units. Most people tend to move from smaller to larger homes until their 40s, when they establish families (and thus include more family members). Later in life they tend to move from larger to smaller homes. Therefore, a larger share of younger individuals relative to older people may raise the aggregate demand for housing for any given level of incomes, user costs and rents (Sørensen, 2013). Given that people moving to Stockholm are primarily between 21-29, one could assume that this contributes to an increase in housing prices as the aggregate demand increases. However, Stockholm Chamber of Commerce (2014a) argues that this age group has limited financial resources. People between the ages 21-29 are most likely financially constrained, given that a large portion within this age group that move to Stockholm are recent graduates of higher level studies, and therefore have limited experience (and accumulated income) in the working market. This leaves them with the choice to either rent apartments second hand, or continue living at home. In fact, it is common nowadays that individual's in their 20s live at home due to the difficulties of purchasing housing in Stockholm (Stockholm Chamber of Commerce, 2014a). Considering that young people are financially constrained, and that they only amount to ~5% of Stockholm's population growth, this demographic is unlikely to significantly impact the housing market. The more significant portion (~43%) of immigrants to Stockholm is foreigners who largely consist of refugees. They too should be financially constrained as they have difficulties in establishing themselves in the working market, and probably have limited wealth due to war conditions in their home country (Stockholm Chamber of Commerce, 2014).

Let us clarify what we mean by financial constraints with an example. The average price for an apartment in the county of Stockholm was approximately 2.7 million SEK in 2014 (Statistics Sweden, 2015). To purchase this through a loan, they will need to meet the minimum requirement of 15% of the loan from their own pockets, as well as having a stable income. This would require the younger people and foreigners to put up 405,000 SEK of their own money to purchase an apartment. It is

unlikely that they have accumulated enough cash to meet the loan-to-value requirement of such apartments. Therefore, they are more prone to looking for housing in the outer regions of Stockholm, where prices are much lower, or look toward the rental market. As such, the demographic of younger people and foreign immigrants will primarily have an effect on aggregate demand for housing in the *outer* regions of Stockholm.

The expected *future* population growth trend could also have some impact on the present value of housing units. If we expect that population will continue to grow, then we can speculate that the aggregate demand for housing units will continue to increase and thereby have an increasing effect on the present value of housing. In other words, the future trend in population growth may affect peoples' assumptions of whether the housing prices will continue to increase.

Graph 21. Prognosis of future population growth



Source: Stockholm Chamber of Commerce, 2014a, p.13.

Graph 21 shows a prognosis on the expected future population growth trend in Stockholm. The graph illustrates a high case and low case scenario.

The prognosis shows that the high population growth rate that has been witnessed in Stockholm during the past 10-20 years is expected to grow in a similar pace in several decades to come. The structure is expected to be similar too, i.e. the proportions of net birth rate, net urbanization, and net

foreign immigration will remain constant. There is one high case (orange dotted line) and one low case scenario (green dotted line) presented. The variations in these scenarios are primarily attributed to the number of refugees. Notice that this prognosis was done in 2014, and now in 2015-2016 we are witnessing the largest refugee crisis in Europe since World War II ("Enlighet krävs", 2015, Aug. 24). In 2015 there have been 112,000 refugees seeking asylum in Sweden. In October 2015 alone, the number was 39,000 ("Aktuell Statistik", n.d.). Stockholm is the city that has received most refugees in the country in 2015.

It is difficult to determine how the population increase due to refugees will impact the housing market in Stockholm. Naturally, demand for housing will go up as the population increases, but the financial availability for refugees seem to be somewhat constrained. They are not able to purchase homes at market prices in Stockholm and should therefore not contribute to an overall price increase on housing. On the other hand it may affect supply. Recently, there are great difficulties in being able to provide living accommodations in Sweden ("Flyktingströmmen ökar", 2015, Oct. 22). Arguably, the municipality of Stockholm will perhaps become forced to occupy households in the existing housing stock and future stock (newly constructed) in Stockholm (that is owned by the municipality) in order to provide accommodation for refugees. This in turn would result in less supply available in the market for potential homebuyers, thus reducing overall supply of housing. Will this potential decrease in supply have an effect on the overall housing market, driving prices upwards? It is not unlikely.

The construction of new homes has not been able to satisfy the increasing demand, where the gap has been consistently increasing since 2010 (graph 19). And now, with the refugee crisis, the gap between supply and increasing demand will increase further. If the trend in new construction continues at a similar rate as to previous years, the supply has no chance to meet the consistently increasing aggregate demand, and thus, *ceteris paribus,* housing prices will continue to increase.

In conclusion, a large portion of the population growth is a demographic that is financially constrained. These include younger people and foreign immigrants (and refugees). The result is a propensity to seeking housing alternatives in the outer regions of Stockholm (where households are cheaper), or living at home, or with friends and relatives. Given that the trend of net population growth continues upwards (and is expected to increase for decades to come) we can expect the

aggregate demand for housing to increase indefinitely (for both inner and outer regions of Stockholm). The construction of new housing is not growing at a similar rate as population growth. Therefore, the supply of new housing cannot meet the increase in aggregate demand. All in all, a large part of what contributes to the population growth in Stockholm seems to have the most significant effect on housing prices primarily in the *outer* regions of Stockholm, as many are financially constrained and therefore seek cheaper residency. Therefore we suggest that the effect of the increasing population on aggregate demand of housing is not as great as the numbers would suggest, since a large portion is not able to enter the housing market due to financial constraints.

8. The Supply Side of Housing

In this section we review the supply of housing in Stockholm. We start with a discussion of the importance of analyzing the supply side of housing. We then review the rental markets, divided into first-hand and second-hand rentals. We continue with a review of the market for supply of new housing, and will discuss various reasons as to why new construction is having difficulties in keeping up with the high aggregate demand for housing. Finally we look into the supply of housing within the already existing housing stock, by showing a trend of housing units for sale, as well as a discussion concerning mobility amongst current homeowners.

The dynamics of housing prices are often studied through demand side factors, even though the supply side has important implications for the dynamics of housing prices (Paciorek, 2013). For instance, real estate agents in Stockholm have argued that the low supply of housing in Stockholm may be one of the most important factors for the increasing housing prices ("Mäklarinsikt 2016:1", 2016). Therefore, we will review the different kinds of housing supply in Stockholm. The supply of housing in Stockholm can be categorized into the rental market and the market for owned housing. According to Muellbauer (2012), both the rental market and the market for owned housing impact the housing prices. Since rental apartments can function as a substitute for an owned home, the functioning of the rental market directly affects the market for owned housing. With regards to the market for owned housing, Proterba (1991) argues that the market for owned housing can be seen as two different housing markets, a market for new housing construction and a market within the existing housing stock.

Due to the high demand for housing and the increase in housing prices over the years in Stockholm, advocates of well-functioning markets would expect the supply of new housing construction to respond to the price development (Shiller, 2008). However, as we will see, the new housing supply has been relatively low over time, and Englund (2011) argues that it is essential to understand why the supply of new housing in Sweden has been so modest despite intense price increases. According to Englund (2011) can a substantial increase in housing prices be an effect of new supply not being able to meet the demand. In other words supply is generally regarded inelastic in the short run in response

to increasing housing prices. We therefore analyze the market for new supply of housing in Stockholm and look at factors that may explain why the supply of new housing has been low and inelastic in Stockholm despite rising housing prices. The total supply of owned housing in Stockholm is however not only generated by the supply of new housing. The supply of owned housing is also impacted by the supply of housing within the existing housing stock. It is thus essential to review the supply of housing within the existing housing stock.

8.1 The Rental Markets

The rental market in Stockholm can be divided into two kinds of rentals, first-hand contracts and second-hand contracts. We will first look at the first-hand contract market in Stockholm and thereafter turn to the second-hand market. A common way to determine the right price for owned housing is to compare the costs for the owned housing with the costs of rental housing (Englund, 2011). We provide an example of second-hand rent versus buying a similar sized tenant-owned apartment in the same area of Stockholm.

8.1.1 The First-Hand Rental Market

The rents for first-hand contracts in Sweden are regulated by rent control. This means that the rents for first-hand contract apartments do not increase as a result from higher demand in the housing market but is instead negotiated between landlords and tenant representatives. The negotiation usually results in significantly lower rents than market rents. The low rents set by the rent control has been suggested as one of the reasons for the housing shortage in Stockholm as it may allow households to stay in unnecessary large housing (Stockholm Chamber of Commerce, 2014a)

We provide a view of the rents in the first-hand contract rental market, even though rent levels for first-hand contracts in Stockholm are difficult to obtain. One needs to bear in mind that rents differ due to various characteristics of the housing. In the following, we have average rents for one-room and two-room first hand rentals that were put out for second-hand rent on the Internet site *Blocket.se* (Jacobsson, 2015 Jul. 10). These provide a picture of the rent levels for first-hand rentals.

The average rent for a one-room apartment was 5,824 SEK while the average rent for a two-room apartment was 9,708 SEK as of the 10th of July 2015. These rents are significantly lower than the average rents tenant-owners charge for their one and two room apartments, 8,247 SEK and 12,051 SEK, respectively when renting out in second-hand (Jacobsson, 2015 Jul. 10).

The rental market for first-hand contracts in Stockholm has gone through a fundamental shift in the recent years, where tenants of first-hand rental apartments have been allowed to buy the rental apartments from public housing and private rental companies, to convert them into tenant-owned apartments. 112,000 first-hand rental apartments in Stockholm were converted into tenant-owned apartments between the year 2000 and 2011 (Swedish Central Bank, 2014). In order to convert the rentals, the tenants create an association that buys the property and each tenant becomes a tenant-owner of the apartment. The association owns the building and the tenant-owner owns the right to live in the apartment and pays a monthly fee to the association, instead of paying rents to the landlord. This fee should cover the tenant-owned apartments' share of the association's costs for interest, amortization and operating and maintenance costs ("Tenant-Owned", n.d.).

The benefits of converting a rental contract to a tenant-owned apartment have been large for those who have converted. First, the prices of the rental apartments that have been converted have usually been far lower than if the apartments had been sold in the open market ("Ombildning.nu", n.d.). For instance, a six-room apartment in the central Stockholm owned by the municipal public housing company *Svenska Bostäder* allowed the tenant to buy the rental apartment for 3 Million SEK in 2009, and only a month later the same apartment was put out for sale for around 9.5 million SEK with an expected sales price of above 10 million SEK (Berglund, 2010, Mar. 29). Second, the monthly fees can be kept lower than normal rents. Third, the tenant owner can deduct interest payments against taxable income. Moreover, the tenant owner has possibilities to renovate the apartment and the converted tenant-owned apartments can be sold in the open market to market prices. Rental contracts are severely limited in these aspects and it is usually impossible to sign away rental contracts from public housing ("Ombildning.nu", n.d.).

This shift from first-hand rental apartments to tenant-owned apartments has dried up the market for first-hand rentals in Stockholm and the proportion of rental apartments have decreased substantially.

When the number of available rental apartments decrease, the time for those waiting in line for rental apartments inevitably increases. The estimated waiting time for a first-hand contract rental apartment in Stockholm varies due to the location, size of housing, and the level of rent. For first-hand rental apartments in the city of Stockholm, the estimated waiting time is around 13 years. The waiting time in local suburban areas is estimated to 10 years while further away from the city is estimated to 8 years ("Hur lång tid", n.d.). According to the municipal rental department in Stockholm, the average waiting time for rental apartments in 2014 in the whole county was 7.7 years (Hellekant, 2015, Aug. 26). As of September 2013, more than 400,000 persons were waiting in line for a first-hand rental apartment in Stockholm, and as of 2015 close to 500,000 persons were in the municipal waiting line (Gustavsson, 2015, Aug. 19).

Since housing is a basic and urgent need, one cannot wait until one receives a first-hand rental contract. The long waiting lines have created a black market for first-hand rental contracts. The black market for rental contracts in Stockholm had a turnover of at least 1,200 million SEK in 2006 (Fastighetsägarna, 2006). According to Leijonhufvud (2014, Feb. 21), are the prices for first-hand rental contracts in the black market around 200,000 SEK per room for apartments in the center of Stockholm. However, there are several persons revealing that there are contracts that have been sold for over a million SEK on the black market even though it is illegal.

Consequently, with a significant waiting time and widespread black market for first-hand rental contracts, it is difficult to argue that the first-hand rental apartment's work as a substitute for owned apartments. As a result of the bad-functioning first-hand rental market, people needing housing in Stockholm that are unable to wait for a first-hand rental contract, and do not want to be involved in the black market, are forced to either rent in the second-hand market or buy in the open market.

8.1.2 The Second-Hand Rental Market

The second-hand market is composed of apartments and houses that are rented out by the owner for a limited time. By reviewing ads for second-hand rentals on the Internet site *Blocket.se,* we see that the market is characterized by relatively short-term contracts and the contract periods usually vary between some months to a year. In some cases there exists a possibility of extending the contract another year. Hence, from the renters' perspective, the second-hand market is less secure than having

a first-hand contract or owning a home as one may be forced to move out with relatively short notice. In February 2013, the government changed the rules for second-hand rentals, which loosened the previously restricted market rents for second-hand renting (Fastighetsägarna, 2013). The new rules allow homeowners to basically charge whatever the second-hand renter is willing to pay in rent, without allowing the renter the possibility to claim back the "overprice" as earlier regulation allowed. It became harder for associations of tenant-owned apartments to refuse homeowners that wanted to rent out their apartments second-hand. Furthermore, before the new regulations were implemented, a report was conducted by Finnochiaro, Nilsson, Nyberg, & Soultanaeva (2011), who stated that the private market for rental (second-hand market) was underdeveloped, which had limited the speculation opportunities.

From the renter's perspective, there is a risk that a large demand for housing pushes up the rents for second-hand rentals over time. The renter thus risks paying larger rents each month than an owned home potentially would cost each month. The second-hand rents in Stockholm have increased significantly in recent years as a consequence of the changes. In July 2015, the second-hand rents had increased by on average 40% since the new changes in the second hand market on the 1th of February 2013 (Jacobsson, 2015, Jul.10).

We will provide an example where we look at the costs of owning an apartment with the minimum down payment and compare it to the costs of renting an equally sized apartment on the Internet site *Blocket.se* (a site that is used as a tool to find second-hand rental apartments). The location is an important factor for pricing individual apartments and thus we try to find apartments in the same area. A complete comparison is however impossible as the price of apartments often is a combination of various factors like the fee to the association, the exact location and the size of the apartment. These factors are not observable for second-hand rentals since the second hand rent is a single fixed sum to the owner.

Example from *Blocket.se*: A furnished and renovated 1-room apartment on Kungsholmen (24 square meters) is rented out for 11,000 SEK per month (July 2015).

An overview from *Hemnet.se* (the site where almost all housing for sale in Sweden is advertised), we can find the sales for similar-sized apartments in Kungsholmen in July 2015:

Apartment for sale: 1-room apartment on Kungsholmen of 23 square meters with a monthly fee of 910 SEK sold for 3,050,000 SEK the 16th of July 2015. It was put out for sale for 2,195,000 SEK, and saw a price increase of 39% making the square meter price 132,609 SEK.

Assumptions: to calculate the monthly costs of Apartment 1, we assume a 15% down payment of the purchase price with Blanco-loan at 3%, no amortizations, a property tax of 1,200 SEK per year, and a 2% yearly interest rate of the remaining mortgage loan and the monthly fee of 910 SEK (See **Appendix 2** for calculations). The monthly cost of owning apartment 1 is 4,835 SEK. The cost of renting second-hand is 11,000 SEK.

Given the assumptions, the buyer can even amortize the difference between the rent of 11,000 per month and the monthly cost of 4,835. If the buyer amortizes the difference, 6,165 per month (11,000 - 4,835), the buyer still ends up with the same monthly cost as if he or she were to rent second-hand. This would yield a yearly amortization of around 73,500 SEK. With a yearly amortization of 73,500 SEK, 3,050,000 SEK are amortized in around 41 years. However, due to accumulated amortizations, the remaining loan that needs to be amortized decreases over time. This effectively reduces the interest that needs to be paid as the loan becomes smaller. This in turn may allow for increasing amortizations. This example is however sensitive to changes in the interest rates over time.

In the example we see that it would be cheaper each month to buy the apartment instead of renting, given that the assumptions hold. This also supports our simplified user cost model (Section 5.4), where we showed that user costs for owning are lower than renting. Also, this example does not include the hefty capital gains that homeowners can expect at the current appreciating housing price rates. However, we do not claim that this example justifies the current housing prices. Rather the example should illustrate that given the rents of second-hand rentals, buyers may justify buying housing if they can lower their monthly costs compared with renting in the second-hand market. In the prevailing interest rate environment, the monthly costs can be lower than compared to renting in the second-hand market, even if the buyer becomes heavily indebted.

As we have shown in Section: 6 concerning credit market developments, the debt levels in Sweden and particularly in Stockholm have increased substantially. The increase in debt people take on may indicate that people do not seem to have a problem of becoming indebted by owning. Furthermore, by

purchasing, the housing buyer avoids having short-term contracts and the risk of having to move out with short notice. However, as housing prices have increased to historically high levels, buying housing may not be an alternative for credit constrained individuals. Credit constraint individuals may hence be forced to rent in the second-hand market. While credit-constrained individuals may be left to the second-hand rental market, others that are not credit-constrained may take advantage of the current market situation and own more apartments with the purpose of renting out in the second-hand market. For instance, the real estate agent Erik Olsson has reflected on this and says: "This can be seen Copenhagen and London, to name a few. The rules for what can be charged in rent have changed, and it has become more profitable to rent out second-hand. So we will now see purchases through speculation where all of a sudden more people own several apartments" (Burgerfeldt, 2015, Feb. 4).

The ability to charge market rent may also incentivize people to keep their housing with the purpose of renting out, instead of selling. According to *Svenska Dagbladet*, a man who put out his apartment for 15,000 SEK per month said: "I want to rent out so I can move home to my mom during the autumn and make some money" (Delling, 2013, Oct. 2). Another says that she was surprised that around 30 persons wanted to pay 12,000 SEK for her one-room apartment in the central Stockholm. "I would not have paid it myself to live in a one-room apartment in the central Stockholm, the rent covers my costs by far" (Delling, 2013, Oct. 2). The new rules that allow the owner to charge "market rents" in the second-hand market, may hence not only contribute to lower number of housing units for sale but may also increase the demand for housing as a result of individuals buying housing solely to rent them out.

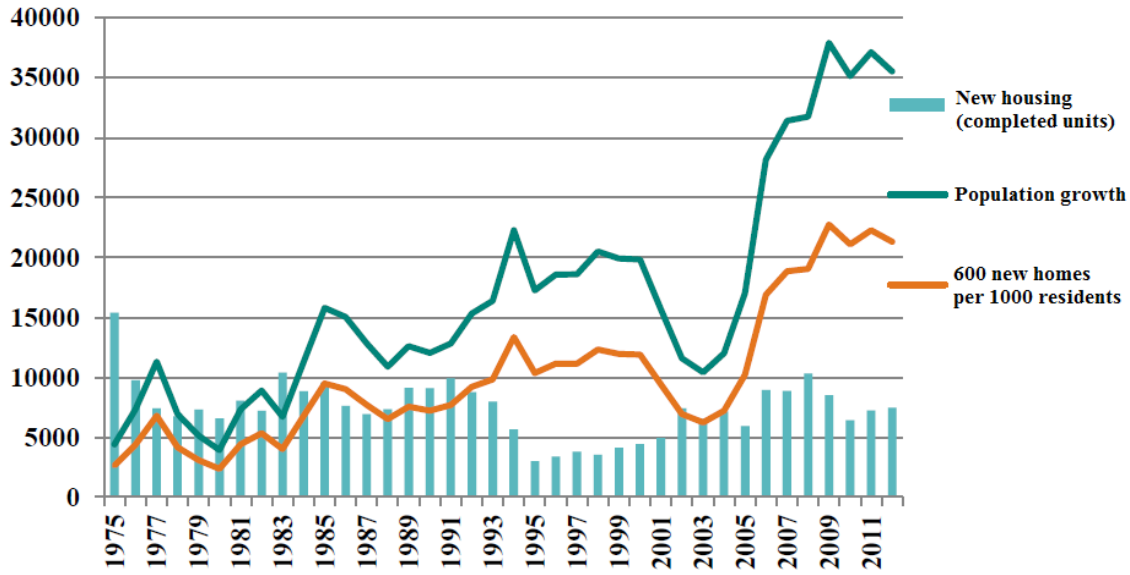
To conclude, the first-hand rental market is underdeveloped and it proves to be very difficult to obtain first-hand rental contracts. Because of this individuals are either forced to: a) rent in the black market, b) rent second-hand, or c) purchase a home. We have also shown that new regulations for renting second-hand allow renters to set their own rent levels. These levels are far above the user costs of housing (costs for maintaining an owned home). This seems to have significantly impacted the aggregate demand for ownership of housing, and has thus contributed to the vast price growth rate in Stockholm during the last few years.

8.2 The Market for Supply of New Housing

The market for supply of new housing adheres to the construction of new housing. As we will see in this section, there may be several implications and regulations that hinder the construction of new housing.

It is difficult to determine how to analyze the supply of new housing since housing differs in sizes and costs of construction. Nonetheless, we look at the number of newly constructed housing units, which includes both houses and apartments.

Graph 22. Newly constructed housing units (completed) and population growth



Source: Stockholm Chamber of Commerce, 2014b, p. 5.

Graph 22 shows the number of newly completed housing units and Stockholm's population growth. The orange line represents the need of 0.6 housing units needed per person (Stockholm Chamber of Commerce, 2014-1). Unfortunately there is no data available beyond 2012.

As we see, the historical building rates in Stockholm amounted to between 7,500 and 10,000 housing units per year before the Swedish crisis in early 1990s when the construction rates suddenly fell dramatically. The yearly new construction in Stockholm was on average around 5,000 housing units

from 1994 to 2005. Not until 2006 were the construction rates back to similar levels as prior to the crisis in the 90s, with the highest construction rates in 2008. Between 2009 and 2012 the housing units constructed in Stockholm averaged around 7500 per year. The rate of construction has however increased quite significantly since 2012, and in 2015 20,000 were expected to be built in Stockholm County. Despite this, there is still estimated to be a shortage in the years to come (Samuelsson, 2015, Apr. 14).

Stockholm Chamber of Commerce (2014b) estimated that in 2012 Stockholm had a housing shortage of around 122,000 housing units. It was suggested that the yearly construction rates in Stockholm need to amount to around 24,000 housing units per year due to the estimated population growth of around 40,000 persons per year, based on the assumption that 0.6 housing units is needed per person. Furthermore, Stockholm Chamber of Commerce (2014b) indicated that around 400,000 housing units need to be built in the county of Stockholm before the year 2030, in order to balance out the increasing need for housing and previously historically low building rates. As of 2015, the National Board of Housing (2015a) argues that the construction rates in Stockholm need to amount to around 18,700 housing units per year with a total of 261,600 housing units before year 2025.

The figures between Stockholm's Chamber of Commerce and The Swedish National board of Housing differ slightly in their estimations of the housing need in Stockholm due to estimations of population growth. However, having all these figures (even though estimations of population growth are indeed estimations), it is easy to determine that the housing market in Stockholm is characterized by a substantial housing shortage. At the same time, The National Board of Housing, Building and Planning (2015a) suggests that the current need of new construction in the whole of Sweden amounts to 426,000 housing units before year 2020, in order to meet the population growth and to make up for previous low building rates. The National Board of Housing, Building and Planning (2015a) hence estimate that around 71,000 housing units need to be constructed in Sweden each year before year 2020. In comparison to Sweden, we see that the housing shortage is particularly large in Stockholm and that a large amount of housing units need to be built in order to meet the demand. As we have reviewed, one may expect that the supply of new housing would have increased due to the rising sales prices of the built housing that the builders then can enjoy. However, there are factors that have hindered the supply to take off.

8.2.1 The Construction Industry and it's Building Capacity

As a result of the current housing shortage and the large amount of housing units needed, the construction industry in Sweden, and in particular Stockholm, need increasing building rates. Even though there is a historically large need for new housing in Stockholm, the capacity of the construction industry remains limited. One reason may be limitations of the building capacity in Stockholm. Jonas Hammarlund (Secretary in the state investigation "Better competition for increased housing building") says in an article published by *Dagens Nyheter*: "It is difficult to see that the Swedish companies have the capacity to build much more. They find it difficult to get skilled people…" (Spängs & Lucas, 2015, Jan. 7). In the same article, Mattias Lundgren, CEO of NCC Living, says the following when asked about the capacity of the construction industry: "In any case we are starting to reach the limit for what the industry is capable of. There is already an existing pool of competent personnel and it does not double because we are to build twice as many dwellings" (Spängs & Lucas, 2015, Jan. 7).

Hence, it seems that the construction industry is close to its capacity and may find it difficult to build in accordance with the increasing housing demand. Since the construction rates of new housing have been low despite increasing demand for housing and increasing housing prices over the years, it may not only be limited capacity within the construction industry that limit the housing supply.

8.2.2 The Regulatory Environment for Housing Construction

According to Malpezzi & Wachter (2002), the supply conditions of housing can also be limited by the regulatory environment. In 2010, the County Administrative Board in Stockholm conducted a report on the structural problems that the housing market in Stockholm faces in relation to new constructions (County Administrative Board, 2010). The report finds that new housing projects often are delayed or hindered in certain ways. Building permissions are needed in order to build housing in Sweden and these are commonly appealed. According to the report are appeals against projected housing the factor that most commonly contributes to delays in new constructions. According to the report, close to all projected new constructions of housing are appealed in the city of Stockholm and around half are appealed in suburbs. Reasons behind the appeals are often related to worry that the new construction will have a negative effect on the value of the appellees' own housing (County Administrative Board,

2010). Due to the appeals, the process from planning until the construction initiation commonly takes around three years, given that the construction starts. There have been examples of the planning process taking eight years until the initiation (County Administrative Board, 2010). The consequences of systematic appeals are lengthening and uncertain planning processes for the developer, which result in higher costs for the projected construction. Furthermore, the planned construction will not be built in the projected time, which contributes to lower and sluggish supply of new housing units. Moreover, the longer planning processes result in lower competition, as fewer developers are willing to take on construction projects (County Administrative Board, 2010). Historically have around 20% of all the projected housing constructions in Stockholm been abolished (Stockholm Chamber of Commerce, 2014b).

As we see, the process of obtaining building permission in Stockholm is complex and lengthening, which hinders new housing constructions and thereby limit new supply. On a positive note, it seems that the government has realized that the stringent rules hamper the rate of new construction. There are now discussions to make the regulatory environment for housing construction less cumbersome in order to increase the rate of new construction (Government Offices of Sweden, 2016) The suggestions include efforts to reduce the time required from initial planning phase to a completed build, and to increase the building capacity.

8.2.3 Production Costs

Another reason as to why new production has not been able to meet aggregate demand is the costs that are incurred during production of a new building - high production costs, relative to what a finished build can be sold for, may imply that it is not profitable to build. Production costs in Sweden are among the highest in Europe, and in Stockholm they are the highest in Sweden (National Board of Housing, Building and Planning, 2015a). Production costs can be separated into two categories: construction costs and developer costs (Bergendal, Löfmark, & Lind, 2015). Construction costs are the necessary costs that are required to construct the actual building. These costs consist primarily of transaction costs, materials and labor. Developer costs include interests, municipal fees and the purchase of land. Notice that land is not included as a part of construction costs. This is because the land is already owned by somebody. So if it were up to the owner whether to build or not to build,

they only take the costs of actually constructing the building into account (National Board of Housing, Building and Planning, 2015b). It is therefore up to the owner of the land to decide whether they want to keep the land as it is, or build. As such, the cost of land is handled as a separate cost from construction costs.

Production costs do not say much without taking the expected market value of which a finished housing unit is able to sell for. The relationship of production costs versus market value of a sale is what determines whether it is affordable to build or not. We will not thoroughly be analyzing productions costs in relation to market value of selling a completed unit, to determine whether a build is profitable or not. This is because we lack data for production costs relative to market value of sold housing units. Instead, we will look at a report conducted by the National Board of Housing, Building and Planning (2015b) which uses Tobin's Q to measures the relationship between construction costs and market value. Tobin's Q is measured by taking the market values of a completed build (the price at which the housing unit is sold on the market), divided by the construction costs (which in this case is the cost to build). A Tobin's Q value of above 1 implies that it is profitable to build. When taking profit into account, developers are looking for values above approximately 1.2 (National Board of Housing, Building and Planning, 2015b). When measuring Tobin's Q, it makes use of *construction costs* and not production costs. In other words, the developer costs are not included, where the most essential of these costs is land. Thus the values are slightly skewed and will portray a higher profitability since the cost of land is not taken into consideration.

The municipality of Stockholm is the major owner of land in Stockholm, owning up to 70% of the land (National Board of Housing, Building and Planning, 2015b). If the municipality does *not* build housing themselves, they can sell the land to external developers. The prices that the land will be sold for must be sold at market prices according to law. This is to eliminate the risk of selling land too cheaply, and thereby giving the buyer an advantage, as their production costs will be lower than what is set by the market, which ultimately distorts competition between different actors (National Board of Housing, Building and Planning, 2015b). The prices of land are therefore fair, and the price that buyers are willing to pay for land will be determined by the budgets that are devised to maximize profit. Buyers estimate the price at which they will be able to sell the finished housing unit, subtracted

by the costs to build. The result (after taking profit into consideration) is the price that they are willing to bid for the land.

It is not much more expensive per square meter to build a building higher. A one-to-two floor building would cost much more per square meter than three floors or more. The marginal cost for adding floors is therefore decreasing. Land in the inner regions of Stockholm is more expensive than the outer regions. Even so, the expensive land prices are usually compensated by building higher and tighter, so the expected value (that developers will be able to sell finished units for) outweigh the additional costs of production (including land). This can be clarified by comparing Tobin's Q of inner versus out regions. In 2009, the Tobin's Q value for apartments in the most central area of Stockholm was at a maximum of 2.90. In 2014, the maximum value was 3.68 (National Board of Housing, Building and Planning, 2015b). These values show an increasing trend and are far above 1; and even when taking land costs into consideration, it is still very profitable to build in central Stockholm. Although construction costs have increased consistently the past decades, housing prices have increased at a faster rate which contributes to an increasing Tobin's Q. As such, there is a very high demand for land in the inner regions, and this demand has increased in parallel to the increasing housing prices. So, it is not the actual costs of construction that drives housing prices upwards (especially so in the inner regions of Stockholm), but rather the very limited supply of land in combination with high demand for housing (National Board of Housing, Building and Planning, 2015b).

After the financial crisis in 2008, Tobin's Q was relatively low in the outer regions in Stockholm (National Board of Housing, Building and Planning, 2015b). Only building in the inner regions was profitable at this time. Given that a construction takes several years to build, this may be a reason to why there is so little new supply of housing units in the current market. However, the Tobin's Q value has increased significantly for the outer regions during recent years (National Board of Housing, Building and Planning, 2015b). Given that the values have increased in the outer regions, one could expect that construction will pick up in these regions, boosting new supply. Unfortunately, this does not seem be the case. One reason for this may be that the construction industry is not saturated; they simply do not have the resources to build enough to cover demand. Furthermore, although profitability of building new housing units in the outer regions has increased, land is scarce. In essence, where demand for new construction is the largest (where profits can be attained), very little

land (or no land) is available, making construction impossible. At the same time, where land *is* available, construction is much less profitable, where projects may struggle to break-even (National Board of Housing, Building and Planning, 2015b). In fact, Tobin's Q has increased during recent years because the construction costs have increased at a slower rate than the housing prices. According to National Board of Housing, Building and Planning (2015b) have the costs for land increased at a *faster* rate than the housing prices. The purchase of land is nowadays the single largest cost for developers (Stockholm Chamber of Commerce, 2014b). This may be an explanation why there has been so little production in Stockholm despite increasing values of Tobin's Q.

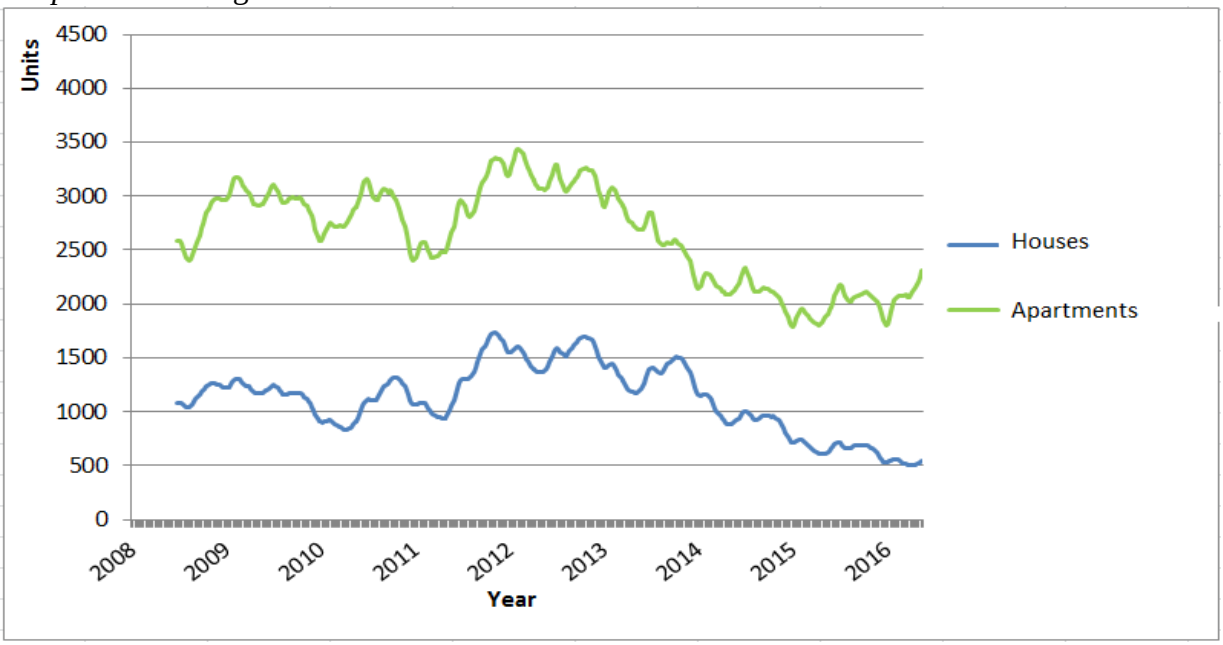
Even if land is available for construction, this does not immediately imply that housing units will be built. Owners of the land may instead choose to wait to build or sell the land in hopes for a more profitable scenario in the future (National Board of Housing, Building and Planning, 2015b). For instance, if housing prices are expected to increase, or construction costs are expected to decrease, it will be more profitable to build in the future. So even if the present value of Tobin's Q is above 1, making it profitable to build now, they may expect an even higher value in the future. By choosing *not* to build will keep supply low, which further contributes to increasing housing prices in the future. Given that housing prices are still increasing at such a rapid pace, landowners are incentivized to wait with housing production. Furthermore, the currently low interest rate, in combination with insufficient building capacity in the construction industry, further incentivizes the choice of postponing a build (National Board of Housing, Building and Planning, 2015b). This may be a contributing factor as to why land is scarce (or unavailable) even in the outer regions where construction would be profitable at the present.

In essence, where land is scarce, it is profitable to build, and where land is available, it is difficult to break even. So despite the fact that construction costs have increased in a slower rate than the housing prices, thus making construction more profitable, development of new units is not able to meet demand due to the scarcity of land.

8.3 The Supply within Stockholm's Existing Housing Stock

We will now be reviewing the supply of the existing housing stock in Stockholm.

Graph 23. Housing units for sale



Source: Hemnet; and own calculations

Graph 23 shows the trend of the number of housing units out for sale (the existing housing stock) for both houses and apartments in Stockholm, between years 2008-2016. The data is a 6 month moving average on weekly data. Data is unavailable before 2008.

As we can see in the graph, the number of housing units for sale has decreased significantly in the recent years. Interestingly, the number of units for sale increased quite significantly during mid-2011 to early 2012. This was during a time when expectations in Stockholm were low (See graph 9 in Section: 5.2), mortgage rates had a period where they were increasing (See graph 11, Section 5.3) and housing prices were decreasing (See graph 1 in Section: 3). Since early 2011, the number of units for sale have decreased consistently. In the meantime, expectations on future housing prices have increased, mortgage rates have been decreasing, and housing prices have been increasing. There seems to be an undeniable correlation between the number of housing units for sale on the market, and

the movement of expectations, mortgage rates, and housing prices. This is precisely the behavior one could expect. The increase of housing units for sale in mid-2011 to early 2012 is a result of homeowners believing that housing prices will go down, and costs for servicing a home was becoming more expensive. They were therefore willing to sell in order to avoid losses on future capital gains.

The low supply in Stockholm has frequently been debated with the concern that the housing market is characterized by low mobility and that the lower mobility leads to lower supply within the existing housing stock (see for instance Liljeberg & Eliasson, 2014, Feb. 20; and "Svensk bostadsmarknad", 2015, May. 26). "Low mobility" in this section may be thought of as a low ability or willingness to move from the current home in favor for another home. A "low mobility" hence contributes to lower supply of the existing housing stock. For instance, Stockholm Chamber of Commerce (2011) analyzed the mobility of the housing market in Stockholm in 2011, and found that around 50,000 housing units are considered too large by those that live in them. A low mobility hence implies that fewer people are willing to change housing despite changing housing needs. There are reasonably different reasons behind the low mobility in Stockholm and we intend to cover some aspects.

In 2011, Englund (2011) describes the process of selling and buying housing in Sweden as a puzzle. It is reasonably more so in the current housing market in Stockholm due to the rapid sales processes. Real estate agents, and the nationwide housing ad website *Hemnet.se*, report that around 25% of the housing units in Stockholm were sold before the public viewing in year 2014 (Billner & Rolander, 2015, Feb. 23). Consequently, homeowners in Stockholm that previously wanted to change housing face a different housing market where the housing for sales commonly are sold only within days and sometimes the same day as published. Therefore, housing buyers have to act fast. Since homeowners commonly need to sell the current housing before they can purchase another, the current market lowers the ability to plan a move in advance. Households that previously could go to different viewings now have to act immediately in order to have a chance on the housing for sale (Billner & Rolander, 2015, Feb. 23). On one hand, the current market may allow people to sell their housing in Stockholm rapidly which then can allow them to observe housing coming out for sale. On the other hand, selling the current housing first may not come without concern as the seller does not know what

kind of housing that will be available and affordable within the time frame (the time from the sale until they have to move out of the sold housing).

Competing for housing also requires that one is willing and able to join the bidding wars that are common. While it is increasingly difficult to change housing in the market for owned housing in Stockholm, it is at the same time a waiting time of above 10 years in order to obtain a first-hand rental contract, which restricts the possibility of renting instead of owning. As previously mentioned, some people may prefer to rent out in second-hand instead of selling, as they are able to charge market rents, which may contribute to lower supply of owned housing than otherwise. Moreover, it is expensive to change housing in Sweden due to different transaction costs in terms of the capital gain tax that has increased further in recent years, and real estate agent fees.

The ability to postpone capital gain taxes became more restricted in 2008, and it is now considered to be more favorable to pay the capital gain taxes immediately (Crofts, 2014, Apr. 7) (Review Section: 5.1.5). As housing prices have increased considerably, and the sellers are left with less money for a new housing purchase if they sell (due to capital gains tax and agent fees), the propensity to move has likely decreased. The capital gain tax may become particularly large for those that bought housing before the significant price development or converted their rental apartment to a tenant-owned apartment at a price far below the market price at that time.

What furthermore seems to impact the mobility within the existing housing stock in Stockholm is that the user cost for staying in an owned housing has been substantially low over the years due to a combination of user cost factors. For instance, the maximum tax cap has decreased the yearly taxation for homeowners in Stockholm particularly, the mortgage rate is historically low, 30% of the interest payments are still tax deductible, longer amortization periods that lower the monthly payments are common, and the ability to extract equity on the perceived housing value has increased with the housing price development. As a consequence, it may thus not be possible to lower the housing costs to such a degree that incentivizes a change in housing. Hence, people may not need to adjust their housing costs by changing down the ladder as their circumstances change.

The already low supply may generate even lower supply within the existing housing stock, as it in practice is relatively difficult to change housing. Furthermore, in September 2015, the supply of

housing units for sale was at record-low levels (Lucas, 2015, 02 Sep.). It is however difficult to analyze to what degree the historically low supply within the existing housing stock impacts the housing prices, but it is reasonable that the low supply raises the prices of the housing actually sold. According to a survey by "Mäklarinsikt 2016:1" (2016), real estate agents in Stockholm believe that the low supply of housing may be the factor that affects the housing prices most.

9. Summaries and Conclusions

In this section will briefly summarize the sections throughout the thesis (sections 3-8). Subsequent to this we will provide the basis for answering our two research questions by analyzing demand and supply factors (thereby explaining why the housing prices have developed to its current state), as well as discussing various future scenarios of changing fundamental factors. Finally we will discuss what the indicators of price-to-income and price-to-rent point towards – whether housing prices seem to be deviating from its fundamentals.

9.1 Summaries

9.1.1 The Price Development in Stockholm

Stockholm has witnessed tremendous growth in housing prices since the Swedish banking crisis ended in 1994. We provided a graph of the real price development of houses in Sweden and Stockholm since 1986. The graph illustrates a real price increase of houses in Stockholm of 330% and in Sweden of 200% since the mid-1990s. The house prices in Stockholm grew consistently until the global financial crisis in 2008, but recuperated shortly thereafter. Only in 2012 did Stockholm experience another small dip in prices before appreciating again. During the last 3 years, Stockholm has had an escalating growth rate. Although Agnello & Schuknecht (2009) argued that the price boom had ended in 2008, it turned out that the dip was only temporary. Instead, we argue that the boom has been continuous since 1994, which makes the housing boom in Sweden one of the longest booms of all time.

We also provided a graph for the growth in prices of apartments; unfortunately the data is only available since 2005. The graph shows that apartments in Stockholm have grown at a close to identical rate as for Sweden. When comparing to house prices, apartment prices have grown at an even quicker rate. Although apartment prices have had an identical growth rate in Sweden and Stockholm, one must realize that the prices in nominal amounts of apartments in Stockholm is substantially higher than for Sweden, so the growing prices affect the affordability in Stockholm to a larger extent. The same is true for house prices.

9.1.2 Housing Prices and Disposable Income

Englund (2011) provided a graph showing the relationship between real house prices and real disposable income per capita between years 1970-2010. During this period, real disposable income had increased at a faster rate than house prices. However, since 1995 the relationship has been reversed - housing prices have increased at a faster rate than disposable income.

We argued that using real disposable income per capita did not take the households size into account. Two households with similar disposable income, but different number of dwellers, will have differences of their affordability. Therefore, we introduced a measure called *equalized disposable income* that takes the households size into consideration. The equalized disposable income has on average always been higher in Stockholm than in Sweden since 1991 until today. House prices have, since 1991, increased at a faster rate than equalized disposable income. For Stockholm, house prices have increased 83% faster, and for Sweden house prices have increased 45.8% faster. It is apparent that the increase in housing prices in relation to income during the past 20 years has not been close to unity, which is a discrepancy to what literature on price-to-income would suggest.

9.1.3 Regulatory Environment Developments

Prior to 2008, a household had to pay a percentage of the assessed value of the home, and there was no maximum cap on the taxation. In 2008, there was a reformation of the tax and instead a municipal property fee was introduced. This fee has a maximum cap of 6,000 SEK for a house and 1,200 SEK for a tenant-owned apartment. We then showed the impact of this tax reformation by using an example for both houses and apartments. A house with a market value of 10 million SEK had a cost of taxation was 75,000 SEK per year (before 2008) and 6,000 SEK per year (after 2008). For an apartment with a market value of 2,723,000 SEK the cost of taxation was 8,169 SEK per year (before 2008), and 1,200 SEK per year (after 2008).

The examples show that the cost of yearly taxation was hugely reduced as a result of the tax reformation (especially so for houses as the new regulation benefited house owners to a larger degree). Owning a home had become much cheaper due to the tax reformation, which most likely increased the willingness to own a home (relative to renting). Homeowners could enjoy significant extra net cash savings each month due to the reduced taxation. Arguably, this has increased the

demand for owning a home significantly, and can be considered one of the main reasons as to why the housing market did not bust during the global financial crisis.

To compensate for the losses to the state as a result of lower taxes, the capital gains tax was simultaneously increased from 20% to 22%. It has been argued by several sources that the increase in taxation, in combination with transaction costs (real estate agent fees), has created a "lock-in" effect, i.e. homeowners become more reluctant to sell. This has restricted supply in the existing supply stock, and thus has allowed for increasing housing prices.

9.1.4 Expectations on Future Housing Prices

We provided a "housing price indicator" that measures the population's expectations on future housing prices. The indicator shows that expectations moves in accordance with housing prices. During times of booming prices, expectations are high, and during busts expectations are low. Unfortunately, the data for expectations is scarce, as we are only able to provide data for approximately 2 years in Stockholm. Still, the data shows that expectations in Stockholm have been consistently higher than in Sweden. Also, expectations have been hitting all-time highs during 2015.

The data does in no way determine whether the expectations are irrational (i.e. not based on fundamentals), but it does clearly demonstrate that expectations are extrapolative. On the other hand, there are some indications that expectations may be (too) high. According to Case & Shiller (2003), there is reason for concern when closing prices are higher than asking prices as this may cause "panic and prices become irrelevant". Data shows that closing prices are consistently higher than asking prices (from the random sample, the closing price is on average 15% higher than asking prices). Furthermore, high expectations (especially so during long periods of price appreciation) has led to vast amounts of speculation. Studies have shown that speculation can fuel a price boom, contributing to further deviations from underlying fundamentals. There are many sources that claim that there is vast speculation in Stockholm, and is a viable concern. For instance, many own double households (viewing a household purchase as a mere investment). One source claims that two thirds of newly constructed apartments are bought for speculation purposes, without the intention of moving in. Others purchase households under intention of renting out second-hand, at higher prices than their user costs. Arguably, it does seem that expectations in Stockholm may be irrationally high, which in

turn has allowed for housing prices to increase further as demand for housing has continued to increase.

9.1.5 Mortgage Rates

The nominal mortgage rates in Sweden have had a consistently declining trend since 1985 until today. The costs of financing a mortgage loan have therefore become cheaper over time, in nominal amounts. To reflect the real costs of mortgage rates, we adjusted the nominal mortgage rates by taking expected inflation and tax deductibility into account (real after-tax interest rate). There were reforms on tax deductibility in 1991, changing tax deductibility from 50% to 30%, which increased the real after-tax rate.

Prior to 1990, the real after-tax rate was negative (largely due to high inflation), but then soared during the Swedish banking crisis. The real after-tax rates have since then consistently declined, and are today once again negative, for the first time in 25 years. This implies that due to expected inflation, and tax deductibility, the costs of financing a mortgage loan has been declining consistently, and is today practically *free.* There seems to be undeniable evidence of the correlation between lower mortgage rates and higher housing prices. As mortgage rates are now at an all-time low, housing prices are at an all-time high.

We also reviewed the trend in maturities of mortgage loans. The variable rates (shorter maturities) have been consistently lower than fixed rates (longer maturities) for 20 years. Accordingly, mortgage borrowers have gone from choosing longer maturities to shorter maturities. In 1996, less than 10% of mortgage borrowers chose variables rates, whereas 20% chose fixed rates longer than 5 years. Today, 60% of all mortgage loans have variable rates, and for new mortgage loans, 76% are variable rates. Only a few percent choose fixed rates longer than 5 years. Choosing shorter maturities allows for mortgage borrowers to afford larger mortgages. On the other hand, mortgage borrowers also face higher risk, as they are more vulnerable to mortgage rate fluctuations. Therefore, a large number of homeowners with mortgage loans today may become distressed when mortgage rates increase.

9.1.6 A Simplified User Cost of Housing Model

Using three key components (taxes, mortgage rates, and expectations on future capital gains) we constructed a simplified user most model to illustrate the trend in user costs for a home owner. The 5 year fixed mortgage rates was used as a proxy for expected future mortgage rates, taxes were given a fixed unit of 0.75% of the market price, and expected future capital gains were estimated using the average growth rate of the house price index over the last three years. The graph shows that user costs have been negative since 1999, which is mostly attributed to high expectations. This essentially means that ownership of housing has been *free* and homeowners have even made profits due to capital gains increases for the past 16 years. Though we do not provide a unit measure for rents, we explain that the cost for renting is always positive. Therefore, the price-to-rent ratio indicates that it has been more favorable to own than to rent between years 1999-2016.

9.1.7 Credit Market Developments

The credit market in Sweden became deregulated in the mid-80s which led to intensified competition between banks and credit institutions, which in turn made credit more available for borrowers. In combination with amortization-free loans (which were introduced in the early 2000s), this has led to more mortgage lending. Chart 1 showed this explicitly, as mortgage debt in relation to GDP has increased greatly since year 2000.

Due to "unsound" lending practices (where mortgage borrowers in some instances borrowed the full amount of the market value of the home, i.e. 100% LTV), *Finansinspektionen* introduced a maximum LTV ratio of 85% in 2010. The effect did seem to slow down mortgage lending to a certain extent, however mortgage debt has continued to increase in relation to GDP. We argued that a reason for this may be that the 85% LTV ratio has only appeared as a general guideline for banks, and that homeowners have been able to refinance their mortgage debts by revaluating their homes at any given time. It has been said that Swedish households use their homes as a "cash machine" by taking on even more mortgage debt as their collateral value has increased in relation to increasing housing prices.

As there have been no amortization requirements on the bottom loans of mortgages, a phenomenon of an unsound amortization culture has become prevalent. A study that sampled mortgages from the eight largest mortgage providers in Sweden showed that those that amortize on their bottom loans in

Sweden require an amortization time of more than 140 years. Arguably, the amortization-free loans have allowed for mortgage borrowers to take on great amounts of mortgage debt (especially so in Stockholm which has the highest mortgages in Sweden).

To curb this bad amortization culture, and to safeguard the Swedish economy being affected negatively by macroeconomic disturbances, *Finansinspektionen* issued a press release on 11th of March 2015 that introduced new amortization requirements for new mortgage loans, which was intended to be implemented 1st of August 2015. The implementation was postponed due to uncertainties about legal position, but will now be implemented 1st of June 2016. The new amortization requirements would require yearly amortizations down to 50% of the value of the loan, and only allow for revaluation once every 5 years. This would affect new mortgage borrowers greatly as their yearly cash flow would become significantly reduced. The consequence of the press release was that the already hot market became even hotter, as extreme bidding wars became ubiquitous in Stockholm before 1st of August 2015. This indicates that mortgage borrowers value amortization-free loans highly, and were willing to pay marked-up prices in purchasing the home before the requirements came into effect. Arguably, this may be one reason for the extreme housing price development during 2015.

We looked at household debt in relation to disposable income in Stockholm. The debt ratio has increased at an astounding rate since year 2000, and is today at an all-time high. The debt ratio for new mortgage loans in Sweden was in 2014 366%, and 482% in Stockholm. We showed that debt ratios of these magnitudes can potentially imply severe consequences in case of stressed mortgage rate scenarios. At a debt ratio of 482%, and mortgage rate at 8%, the interest ratio (ratio of disposable income used for mortgage payments) would be 26.7%. A debt ratio of 600%, which is not uncommon in Stockholm, would imply an interest ratio of 35%. Finally, we argued that even mortgage rates at a more normalized level (6%) could have significant effects on the Swedish economy as consumption would vastly reduce.

The intensified competition between banks and credit institutions, cheap financing due to low mortgage rates, and amortization-free loans, have all contributed to significant increase in mortgage borrowing and the fueling of housing prices. The high debt ratios that are prevalent today indicate that

the situation is precarious, as an increase in mortgage rates could have severe consequences for the Swedish economy.

9.1.8 Demographics

Stockholm has witnessed astonishing growth in population, especially so since 2009. Only ~5% of the growth can be attributed to urbanization, whereas ~46% was attributed to birth rates and ~43% was attributed to foreign immigration.

We provided a graph showing net population growth in comparison to newly constructed housing units. The trend clearly shows that population has outgrown new construction since 1990, and the gap has widened even further since 2010. Data shows that the increase in population has far outgrown the supply of newly constructed housing units. However, before we drew the conclusion that this would lead to increasing aggregate demand, we also looked at the age structure and financial affordability of the demographic. The majority of people moving to Stockholm were younger people between 20-29 years of age. According to Sørensen (2013) and Englund (2011), younger people tend to move from smaller to larger homes, whereas older people tend to move from larger homes to smaller homes. Therefore, a larger share of younger individuals relative to older people may raise the aggregate demand for housing for any given level of incomes, user costs and rents. On the other hand, Stockholm Chamber of Commerce (2014) claims that this age group is financially constrained since they have limited accumulated income from working experiences, and cannot afford the expensive prices in Stockholm. Sources claim that many individuals in their 20s choose to live at home due to the difficulties of purchasing a home. For foreign immigration, a large portion consists of foreign refugees. This is also a demographic that is assumed to be financially constrained.

We provided a prognosis of the future population growth in Stockholm, which portrayed a high case and low case scenario. Given the vast number of refugees that migrated into Sweden in late 2015, and that more refugees are expected to seek asylum in Sweden, the higher case scenario is likely to occur unless there is some change in foreign immigration policy. Still, it is unlikely that refugees will be able to impact aggregate demand in a significant way, given their financial constrain. Even though Stockholm has witnessed high population growth, it remains uncertain as to what degree they are able to affect aggregate demand in such an expensive housing market. We argue that it is probably to a

lower extent than the "numbers" would suggest due to financial constrain. Nonetheless, it is impossible to ignore that such high population growth numbers has undoubtedly led to higher aggregate demand of housing, and probably will for some time to come.

9.1.9 The Supply Side of Housing

For the supply side of housing we reviewed the rental markets, market for new supply (construction), and the existing housing stock.

The Rental Markets

We reviewed the first-hand and second-hand rental market in Stockholm. The number of first-hand rental apartments has decreased substantially between 2000 and 2011, whilst people that want first-hand contracts are more than 500,000; which has resulted in estimated waiting times above 10 years for a first-hand rental contract in Stockholm. It is hence possible to see that the first-hand contract market for rental apartments in Stockholm is not a substitute for those in immediate need of housing. The long waiting time for first-hand contracts force people to either rent in the more expensive second-hand rental market or to buy housing in the open market. In the provided example, we compared the monthly costs of renting in the second-hand market versus the monthly costs of buying a similar apartment in the same area. We find that a buyer in the current market may justify buying an apartment in order to lower its monthly costs instead of renting a similar apartment in the second-hand market. Buying may however not be an option for everyone since a housing purchase generally requires a down payment. Credit constrained households may therefore be forced to rent in the second-hand market.

Finnochiaro et al., (2011) argued that an undeveloped private market for second-hand rentals had limited speculation within the rental market. However, since the 1th of February 2013, the housing market in Stockholm has become more developed as people are allowed to rent out and charge market rents. This regulatory change may lower the incentives to sell the housing while it may increase the incentives to own apartments with the purpose of renting out. The more developed second-hand rental has led to more speculation within the housing market in Stockholm, as there are those who speculate with the purpose of renting out second-hand at marked up prices. Hence, the regulatory change and

the substantial increase in second-hand rents may thus contribute to larger demand for owned housing and decreased supply, which ultimately push up the housing prices of the sold housing units.

The Market for Supply of New Housing

The low rates of new construction have over a long time contributed to the current and significant housing shortage in Stockholm despite increased demand and rising housing prices. The construction rate has improved during the past 2-3 years, but is still not able to meet increasing aggregate demand. Therefore, there is still expected to be a housing shortage for several years to come.

There are various factors that have impacted the new housing supply negatively over the years and contributed to higher housing prices. The building capacity seems to be at its maximum capacity, and is therefore not able to meet the needs of increased aggregate demand. The regulatory environment related to housing construction in Stockholm has hindered and delayed constructions of new housing in various ways, while it simultaneously raises the costs of housing constructions. Furthermore, the little buildable land available for housing construction in Stockholm has made it difficult to build, and consequently raises the prices of buildable land, which makes completed housing constructions more expensive than otherwise. Also, we have shown by the use of Tobin's Q that where it is profitable to build, there is very little to no land available. Therefore, it is difficult for construction companies to find profitable opportunities. These complex, ineffective and expensive processes contribute to increasing housing prices. The housing shortage is furthermore expected to increase in the coming years in accordance with the substantial population growth. It hence seems to become a challenge for the regulators to unify the current regulations and processes with increased building rates. Additionally, due to the high rates of housing construction needed in Stockholm the coming years, combined with the substantial need for construction in other parts of Sweden, it poses a major challenge for the construction industry in Sweden and particularly in Stockholm that is already building close to its limits. On the other hand, the government has proposed suggestions that will loosen the cumbersome regulations, in order to increase building capacity and reduce the time for construction between planning and a completed build.

The Supply within Stockholm's Existing Housing Stock

The supply within the existing housing stock in Stockholm has decreased over the years. We showed that there seems to be an undeniable relationship between the number of housing units for sale on the market with expectations, mortgage rates, and the housing price development.

We have reviewed factors that may impact the propensity to change housing, and thereby explain the low mobility in Stockholm. These factors indicate that it currently may not be economically favorable to change housing by selling, which seem to affect the supply in the existing housing stock negatively. A contributing factor for the low supply of owned housing may be the ability to charge market rents on the housing in the second-hand market.

Hence, the current housing market with rapid sales times, in combination with low incentives to change housing, seem to lower the supply within the existing housing stock further. Moreover, the sales processes are usually conducted rapidly (sometimes within a few days), which may make it problematic to change housing and seem to lower the observable housing supply further. The low supply within the existing housing stock intensifies the bidding wars for the housing actually for sale and push up the prices.

9.2 Is the Market Overvalued and/or Sustainable in the Long Run?

Now, the two big questions remain: Is the housing market in Stockholm overvalued? Is the price development of the housing market sustainable in the long run? Some experts claim that the development has been a consequence of fundamental factors, and price is therefore "fair"; whereas others have been skeptical and have warned for a bubble burst (especially during recent years). So, naturally it is difficult to determine whether the market is overvalued (and thereby at the peak of a bubble), or if the price development trend is sustainable. This is partly because we cannot determine to what extent each factor affects the market. Also, to what degree does each factor affect each other? At what point do prices go from being "fair" to "overvalued?" These are difficult questions to address, and there may in fact be no correct answer. Nonetheless, below we provide a discussion of the fundamental factors that will be the basis for answering our two research questions.

9.2.1 Discussing the Fundamental Factors

Due to the tax reformation in 2008, the municipal property tax is today very low, and as we have seen this has had substantial effects on the extra cash homeowners have over after taxes. This has made home ownership more lucrative, as the monthly costs for home ownership have been significantly reduced. As these tax reformations were done in 2008, it seems to have had a substantial effect on mitigating the effects of the financial crisis (through increasing incentives for home ownership), thereby avoiding a housing bust. The tax is today so low, that in order to make the market *more* generous would be to abolish the tax entirely. But this would generate tax losses for the government. Furthermore, the capital gains tax increased from 20 to 22% in 2008, which arguably generated a "lock-in" effect, which has restricted supply in the existing housing stock. If the municipal property tax *were* to be abolished, the capital gains tax would have to increase further to compensate for tax losses. This is not something the government wants to do, as it would restrict mobility (and supply) even further. Reducing capital gains tax would perhaps increase mobility (decreasing the "lock-in" effect), but would also result in huge tax losses for the government. So the possible future scenario is to either keep the taxes at the current level, or increase municipal taxes. An increase in municipal taxes would make home ownership less favorable, and will reduce aggregate demand.

Expectations have been high, and during 2015 expectations have been at record-high levels. The long price appreciating trend seems to have generated solid expectations on further price increases, and a home purchase may therefore be considered a "safe" investment. Perceiving a home purchase as "safe" may be the cause for huge amounts of speculation in Stockholm (in many different forms). The vast amount of speculation is indeed concerning, and seems to have had a substantial effect on the increasing housing prices. For instance, as speculators enter the market, aggregate demand increases, and keeps the supply considerably low. Especially since speculators purchase with the intention of never moving in, only to reap benefits from expected capital gains or rent out second-hand. Furthermore, closing prices are also far above asking prices. Therefore there is also reason to believe, in accordance with Case & Shiller (2003), that potential buyers in Stockholm are in a state of panic where they feel that they need to enter the market before it is too late.

These are all indications that expectations may indeed be at an "irrational" level already. Recall that "irrational" expectations are considered a key component to the cause of a bubble (i.e. the market is overvalued), so these abovementioned factors alone may indicate that there is indeed a bubble. It is unlikely that expectations can increase to even higher levels in the future since housing prices have, during recent years, witnessed incredible growth rate. Such growth cannot last forever, and as soon as prices show indications of slowing down, so will expectations. A lowering of expectations leads to reduced aggregate demand which will slow down the market. In turn, speculators may perceive that the market is becoming more perilous and will extract from the market. Aggregate demand reduces further, and supply increases (as their investments will now be available for sale on the market). This may fuel price depreciation, exacerbating an eventual bust phase.

Mortgage rates are at an all-time low, and allows for mortgage borrowers to take larger mortgages as they are able to finance their mortgage for low costs. The costs for financing a mortgage loan has never been as low as it is today in nominal amounts. Looking at the real-after tax rate, the costs of financing a mortgage is today practically *free.* Low costs of financing allow mortgage borrowers to take high loans and still manage their monthly payments comfortably. Naturally, the consistently lowering of mortgage rates has caused a consistent increase (over time) in aggregate demand of the quality of housing (as people can afford more expensive homes) as well as the quantity (increasing number of potential home buyers). Due to these extremely low financing costs (today at its lowest point in 25 years), individuals have huge incentives for purchasing a home; especially if they are also able to expect additional capital gains on top. Therefore we argue that the decreasing trend in mortgage rates is one of the most essential factors that has allowed for housing prices to appreciate.

The nominal mortgage rates are today far below what is considered "normal". So, it is highly unlikely that rates can become even lower - the only way is to remain constant, or go up. As such, costs for financing a home has reached its lowest state (cannot become cheaper). Since many mortgage borrowers today choose variable rates, they are very sensitive to eventual mortgage rate increases. An increasing mortgage rate may affect variable mortgage borrowers heavily as their monthly payments increase. This will lead to decreasing aggregate demand for housing, as fewer people are able to finance the mortgage payments.

Availability of credit has been lax since 2000 due to deregulation (and thereby increasing competition between financial institutions). At the same time there have been no amortization requirements on bottom loans. This seems to be very lucrative for mortgage borrowers, as they do not seem to mind taking huge mortgages as long as they can finance their monthly payments. The willingness to take on huge mortgage loans is likely due to the high expectations on future prices - the large mortgage does not matter since they can revalue their mortgage at any time (when the value of the home has increased they can even acquire lower rates as the collateral has increased), and when they sell their home they will easily be able to pay off the loan and still reap a generous capital gain. When the 5 year limit on revaluing collateral will be implemented on 1st of June 2016 (i.e. cannot revalue more than once every 5 years), the costs of financing will become more expensive as homeowners have to pay their initial borrowing rate for at least 5 years, even if the collateral has increased in value. Also, when there were discussions of introducing amortization requirements, the market became extremely hot, which only proves that mortgage borrowers value the amortization-free options highly. The amortization requirements will come into effect by 1st of June 2016, and it remains to be seen what effects this will have on the housing market. It may alter the dynamics of the housing market entirely, as the remaining cash flow after mandatory payments becomes significantly reduced. Subsequently, affordability for the entire market becomes significantly reduced. This means that fewer potential home buyers can afford the high levels of mortgages that are today required for purchasing a home; and that already existing homeowners with large mortgage debts will have less money for other expenses. The effect is almost undoubtedly a dampening pressure on housing prices.

The LTV ratio is today at 85%, which limits the vulnerability of the collateral given a depreciation in prices. For first-time buyers, it may be difficult to cover the down payment of 15%, and especially so if prices continue to increase. Since the majority of people moving to Stockholm are below the age of 29, a large portion of these are likely to be first-time buyers. For those born and raised in Stockholm, many choose to live at home for a longer period as they cannot afford the down payment. We can see that the 85% LTV ratio is already becoming an issue (especially for first-time buyers) as they cannot cover the down-payment at today's prices.

Changing the LTV level may have consequences in both directions. An increase to higher levels (90-95%) would implicate banks too much, as banks would be taking on too high levels of risk if prices

were to fall. Also, recall that one key component for the housing bubble in the U.S was high LTV levels of over 90%. If the LTV ratios were instead reduced, banks are more secure during depreciating prices. This would decrease the purchasing power of buyers (and especially first-time buyers) as the mandatory down payment becomes larger. Fewer people would be able to afford high mortgage debts, and thus there would be a decrease in aggregate demand for mortgages which would slow down the housing market, or even induce price depreciation. In either case, changing the LTV could implicate the dynamics of the housing market (either increase risk or reduce aggregate demand).

The high levels of household debt in Stockholm have made mortgage borrowers in Stockholm especially vulnerable to mortgage rate fluctuations. We have previously shown that at scenario of stressed mortgage rates (8%), with a debt ratio of 600% would lead to an interest ratio of 35%. That is, 35% of their disposable income would be attributed to paying the interest rate on mortgages. Also recall that during the Swedish banking crisis the interest ratios were approximately 10% and led to a drastic fall in consumption, thus exacerbating the recession in the economy. So even at normalized mortgage rates at around 4%, the interest ratio in Stockholm will be well above 10% (at the current debt ratio of 482%), which could in turn impact consumption negatively. So, even if all other factors were to remain the same, an increase in mortgage rates to "normal" levels can hugely impact the economy in a negative way. Add this to the new amortization requirement, and the consequences can be dire. Consequently, if homeowners begin to default on their payments, financial institutions will be making losses, and lending becomes more risky. This could then lead to a further increase in mortgage rates (as the risk for banks is higher) - a negative loop of increasing default payments and increasing mortgage rates is born. Demand for housing will plummet, as will housing prices.

The population growth in Stockholm has been vast, especially so since 2009 (and is now growing faster than it has for the past 50 years). This pace has naturally increased the aggregate demand for the number of housing units. Also, there are no signs of the growth slowing down in the future, especially so due to the large stream of foreign refugees. Arguably, population growth differs from the other factors in the sense that it cannot be affected by politics or other regulations; it simply follows its natural course. Keeping all other factors constant, the increase in population will lead to higher housing price as long as new construction has not able to follow the growth pace of the population. In this regard, one can claim that even if other factors change for the worse, people will still need a place

to live and will therefore be willing to pay high prices. However, we have previously discussed that a large portion of the population increase is under financial constrain. If housing prices continue to increase (or the costs of living increases, for instance by increasing mortgage rates), there will come a point where people can no longer afford to live in Stockholm. The growth in population might at this point decrease, as they choose to move elsewhere to more affordable locations. This would reduce the aggregate demand for housing units.

The supply in Stockholm has been low for several reasons. The first-hand rental market is poor, as many rental apartments have transformed into tenant-owned apartments. Getting a first-hand rental contract is today close to impossible. As such, it can barely be considered as a substitute to home ownership. One must therefore rent in the second-hand market, where rents are marked up highly. The high rents indicate that the supply of second-hand rentals are also limited in relation to population demand, and because rents are so high, people have become more willing to purchase than to rent. At the same time, allowing owners to set second-hand rents freely has undoubtedly increased the amount of speculation in Stockholm, and has thereby generated additional risk. It is difficult to introduce any regulations in the second-hand market in the future (where rents are at market prices due to equilibrium of demand and supply) that would increase the supply of second-hand rentals. Setting a maximum cap which is lower than the current rental rates (back to the previous regulations) would make second-hand renting less profitable for owners which would generate less supply. Therefore, the second-hand market is best left alone.

The market for new construction also seems to be poorly developed, as the rate of new construction has been very low and thereby provided a shortage of new supply despite increased demand and appreciating housing prices. This can partially be attributed to a stringent regulatory environment for new construction, which makes the construction of new housing cumbersome through delays and hindering, and at the same time has raised developer costs. Furthermore, land is scarce in Stockholm, and the profitability (Tobin's Q) in the regions where land is available is not sufficiently high (as land prices have increased tremendously) in order to take on construction projects. However, the government has realized the immense problem of the shortage of supply and is discussing potential reforms in regulations that would increase the rate of construction. It is likely that new regulations will occur in the future, as a continuing of little new supply can inflate housing prices to dangerously high

levels. Given the scenario that new construction does get a boost, we can expect the housing market to slow down as it reduces the gap between demand and supply. We do realize that this is perhaps one of the most essential factors that need to change in order for there to be a change in the housing price dynamics. If construction does not increase considerably, the housing prices may continue to increase for a long time.

Finally, we looked at the supply of the existing stock. As we have discussed previously, when prices are expected to increase, homeowners are more reluctant to sell which keeps the supply in the existing stock low. The mobility within the market became more restricted as the capital gains tax increased in 2008 which generated a "lock-in" effect. Due to low mobility it is estimated that many live in households that are bigger than needed. If mobility can improve in the future, perhaps households can become better "saturated". It is, however, difficult to make any suggestions that would improve mobility as current homeowners would require substantial incentives to sell their current home for another, which is more suitable to their size and financial situation.

Combining all of these factors, it is not surprising that the housing market has appreciated to alarmingly high prices due to the extreme conditions. Property taxes have been reduced to insignificant amounts, expectations of future housing prices are at an all-time high, mortgage rate (and real-after tax rate) is at an all-time low, credit regulations are lax and have led to huge mortgage debts (which in turn has generated great risk for homeowners due to high debt ratios), and the population growth has consistently outpaced supply of housing (as construction rates have been historically low due to cumbersome regulations). Therefore, we conclude that the fundamental factors *cannot* become more generous than they are today, which would allow for even higher prices. Nonetheless, population growth is a factor that is consistently increasing and will always have an increasing effect on aggregate demand. But as we have shown, the construction of housing units is very likely to increase in the near future which will likely dampen the effect of increasing aggregate demand.

9.2.2 Indicative Measures of Housing Prices

We have presented two measures in the thesis that indicate whether prices are fairly priced or overvalued. These are price-to-income and price-to-rent.

Looking at price-to-income (Section 4), it is still difficult to determine whether housing prices are "correctly priced" or "too high", even though the housing prices have increased at a remarkable speed in comparison to disposable income, especially so since 1995. To answer this question with certainty, we would need a benchmark in time where we *know* that the housing prices were "correct", given that all fundamental factors that affect the housing prices were correct and accounted for. If we make the bold assumption that housing prices were "correct" in 1991 (beginning of the index), then the price-to-income ratio would clearly suggest that housing prices are now overpriced. However, let us instead assume that housing prices were in 1991 undervalued. Perhaps the housing prices have only been catching up to the correct price? Therefore, such a benchmark does not exist - when, if at all, can housing prices (and all their underlying fundamental factors) be considered correct? And if housing prices are overvalued, then by how much? Nonetheless, the data shown clearly indicates that affordability per household has declined in comparison to the housing prices over the last 20 years. Naturally, such a trend cannot continue forever, as there will reach a point where individuals no longer can afford housing. Given this measure alone however, it does seem likely that at some point during the past 20 years housing prices have exceeded a "correct price", and are therefore priced too high (overvalued). Moreover, previous literature suggests that if housing prices have increased at a faster rate than household income, housing prices must eventually stagnate or fall.

The price-to-rent measure (Section 5.4) provides an indication as to whether it is more favorable to own than to rent. In equilibrium, the cost of ownership should be similar to the costs of renting. We have seen that due to high expectations on capital gains, the cost of ownership (user cost of housing) has been far below than the costs of renting. To an extent, this indicates that housing is too highly valued. On the other hand, we also know that the rental market in Stockholm is not a perfect substitute for owning a home. The first-hand contracts (with low costs to rent) are close to unattainable, so one needs to rent in the second-hand market. In this market, owners are allowed to rent at any given level, so they mark up prices heavily, widening the gap between costs of ownership and rent. This has increased incentives to own a home which has likely contributed to the market values of housing to deviate from its fundamental values.

10. Conclusion

It is actually not surprising that the prices have developed into the current housing market situation of Stockholm as it is today. A long period of declining mortgage rates, high expectations on future housing prices (and speculation), tax changes making ownership of housing cheaper, more availability of credit from financial institutions for financing a home (with no amortization requirements on the bottom loan), and a vast yearly growth rate in population. These factors all point towards one thing - an increase in the aggregate demand for ownership of housing. At the same time there has been an increase in capital gains tax ("lock-in" effect), a poor functioning rental market, little construction of new housing (due to cumbersome regulations and low profitability), speculation that has restricted supply of new housing, and restricted supply of the existing housing stock due to low mobility. These factors have held supply very low. For a long time has supply not been able to meet the increase in aggregate demand, which has naturally allowed for the market to boom in the way it has.

Our first research question is to answer if the market in Stockholm is overvalued. There are several indications that this may be so. Firstly, and perhaps most importantly, is that we believe expectations on capital gains in Stockholm to be irrational. This is largely based on the seemingly huge amount of speculation in Stockholm and that there seems to be hubris for buying. Also, taking on huge mortgage debts has not been considered an issue as long as homeowners are able to finance their monthly payments (which is easily done through generous financing costs, and no amortization requirements), since they expect to make a capital gain when selling in the future. Mortgage borrowers have been moving toward shorter maturities (variable rates) which have allowed them to take even larger mortgages. This indicates that mortgage borrowers seem to underestimate the riskiness of their mortgages, since they may assume that prices will continue to increase and mortgages rates will continue to remain low. This allows for further inflation of housing prices. Finally, we looked at both price-to-income and price-to-rent. Both of these measures indicate that housing prices are overvalued to a certain extent.

The answer to our first research question is: **The housing market in Stockholm is *most likely* overvalued.**

The second research question is to answer if the price development of the housing market is sustainable in the long run. As we have discussed above, the fundamental factors have all moved in a direction which has allowed for prices to appreciate naturally. We argue that the factors are today so extreme (and generous) that the market *cannot* become more ideal in allowing for such a booming nature (that allows for huge demand and very low supply). Future changes in fundamental factors and regulation implementations will most likely *only* have the effect of decreasing aggregate demand, as well as increasing supply. However, we do realize that the supply issue is crucial; if the supply issue is not handled, housing prices may continue to increase as demand through population growth will consistently outweigh new supply. Nonetheless, we believe that the price development is reaching its peak, as demand and supply factors are likely to change in a way that dampens the pressure on the housing market. The question of whether the prices will flatten out or begin to drop remains to be seen. Although, even if prices only were to flatten out, user cost of housing will substantially increase as buyers can no longer expect to reap any capital gains. Perhaps then it will become more profitable to rent than to own. This could, in turn, decrease aggregate demand for ownership and thus housing prices will begin to fall. Furthermore, according to previous studies made on international markets, a boom phase is *always* followed by a bust; and the longer the boom, the harder the bust. It seems unavoidable that at some point in the (near) future housing prices in Stockholm will begin to depreciate.

The answer to our second research question is: **The price development of the housing market in Stockholm *is not* sustainable in the long run.**

On a final note, the depreciation in housing prices during the global financial crisis seems to have been mitigated through regulations, where property taxes were reduced along with a reduction in interest and mortgage rates. But what happens the next time the market will be showing signs of a recession? Mortgage rates cannot be decreased further to increase incentives for ownership of a home, unless financial institutions are willing to take on all risk, with no risk premium, i.e. zero mortgage rates. The government cannot decrease taxes further, which mitigated the downfall during the financial crisis. They cannot make loans more lucrative (except through reintroducing amortization-free loans). So, what can be done? Things will only be able to take its natural course, where politicians and banks will have little power to handle the consequences of a recession.

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Appendix 1

Equalized disposable income:

Consumption unit weights are according to the following scale:

- Single adult: 1.0
- Couple living together: 1.51
- An additional adult: 1.60
- First child 0-19 years old: 0.52
- Second and additional children 0-19 years old: 0.42

Appendix 2

For calculating the yearly payments for Apartment 1, we proceed as follows:

Down payment with Blanco: 15%*3,050,000= 457,500 SEK

Yearly interest payments for Blanco-loan at 3%= 457,500*0.03= 13,725 SEK

Mortgage loan = 3,050,000 – 457,500= 2,592,500 SEK

Yearly interest payments for mortgage loan = 2,592,500*0.02= 51,850

Yearly property tax = 1,200 SEK

The monthly fees 12*910 = 10,920 SEK per year.

30% of the interest payments are tax deductible: 51,850+13,725= 65,575*(1-0.3) = 45,903 in yearly interest payments after tax deduction.

Total payments per year in the current example are the yearly interest payments after interest tax deduction and the yearly fees.

Yearly cost of buying is 1,200 + 10,920 + 45,903 = 56,823SEK

With the yearly cost of 58,023, the monthly cost becomes 58,023/12= 4,835 SEK. In this example, the cost of renting in second hand for 11,000 SEK per month is more than double the monthly costs compared to buying the apartment, given the assumptions.