Table of Contents

Appendix

1 Introduction

Norway, the country of oil that stands strong outside of the European Union has seen an enduring increase in housing prices for over 20 years. Further, Norway's economy was one of the few economies that were mildly affected by the financial crisis of 2008. Compared to many other economies in the world today, the economy of Norway is financially sound and stable and should have no problem to meet another international downturn. However, as the world economy is influenced by a high level of uncertainty it cannot be excluded that Norway's economy might be unable to handle a new crisis as well as the they did in 2008. Of great concern are today's high housing prices and the increasing debt level among households, both seen as the biggest national risk factors affecting Norway's stable economy. If Norway's economy suddenly would change direction house prices might fall as households would be forced to cut back on spending, which in turn would have further negative effects on the economy as a whole (Finanstilsynet, 2012). As of yet, housing prices in Norway are still increasing (Statistisk Sentralbyrå, SSB, 2013a).

Figure 1.1, below, taken from the Bank of Norway shows the pattern of real housing prices in Norway compared to the United States whose bubble burst in 2006/2007. From the figure one can tell that Norway experienced a house bubble in the late 1980's that burst in the beginning of the 1990's. After that a rapid increase that even sharpens after the short downturn connected to the financial crisis is seen.

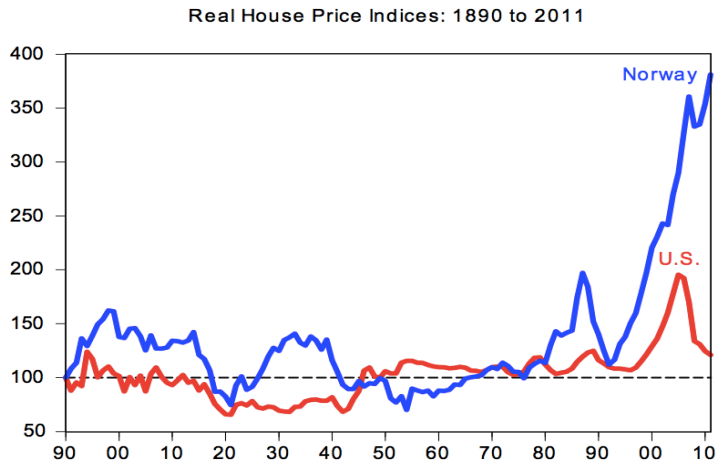

Figure 1.1 Real House Price Indices: 1890 to 2011. Source: Norges Bank (2013).

Looking at the price development presented in figure 1 it seems natural that speculations about a Norwegian house bubble occurs. The price development has been given a lot of attention in the media that has even reported warnings about a bubble in the housing market of Oslo, Norway's capital. The buyers are said to act irrationally and believe that prices will keep increasing, which according to an expert would indicate a bubble (Varsler norsk boligboble, 2013). Yet, many doubt the existence of a bubble in Oslo's housing

market. They claim the price boom can be explained by natural factors, such as increase in household income, low rate of unemployment and the growth in population (Boligprisene kan falle, 2013).

The aim of this thesis is to present a study of Oslo's housing market that has the highest price of housing in Norway and where the price increase has been the most intense (Boligstatestik, 2013). The paper will study what underlying factors have caused the price to keep increasing and the possibility of a bubble.

1.1 Background

The background will begin with a look at the definition of a bubble in housing markets and continue with the concept of housings markets, which will be followed by short review of different housing markets.

1.1.1 Defining a bubble in housing markets

Bubbles in housing market are not a new occurrence (Quigley, 2001) however; the usage of the term is quite new. It was first in 2002 that media picked up on the term 'housing bubble' (Case & Shiller, 2003). Since then the term has been used frequently, especially lately as several housing markets around the globe have experienced bubbles, followed consequently by bursts. Yet the concept of a price bubble is rather complicated.

In peoples mind the occurrence of a price bubble imply a negative judgment and defines an opinion that current price levels cannot be sustained (Case & Shiller, 2003). Lind (2009), wish to focus on the price movement when defining a bubble; the extreme increase followed by a dramatic fall. There is no clear or recognized definition of bubble, yet, one of the most commonly known definitions of a price bubble is Stiglitz':

"*If the reason that the price is high today is only because investors believe that the selling price is high tomorrow - when 'fundamental' factors do not seem to justify such a price - then a bubble exists*" (Stiglitz 1990, p. 13).

The definition implies that a bubble occurs as a result of irrational believes not based on fundamental factors. To understand the definition fully, the meaning of 'fundamental' factors should be identified. Fundamental factors are factors effecting supply and demand to change (Englund, 2011). When Case and Shiller (2003), wanted to examine whether changes in fundamental factors could justify the price booms in housing markets; they studied the change of different economic factors that are typically causing 'natural' price increases in housing, such as income growth, population growth and low interest rates. Thus, changes in a market's economic conditions that cause price to fluctuate in response to these changes (Quigley, 2001). Stiglitz (1990) explains that the price of an asset is efficient when it represents pure fundamental value. Bubbles are then likely appearing when fundamentals become difficult to assess (White 1990). It is however not possible to eliminate suspicions about a bubble in a market by just looking at economic variables. Previous price increases, are often giving birth to expectations about prices increasing at the same rate in the future (Case & Shiller, 2003). Changes of the economic conditions may therefore initiate a boom that is sustained by an underlying bubble (White, 1990).

Lind (2009), who finds Stiglitz' definition of a price bubble insufficient, developed a list of bubble indicators based on previous research of housing bubbles, to help predict housing

bubbles. These indicators measures or put focus on factors in the market that has contributed to previous house bubbles. Observing such factors in relation to price should help reveal an unstable development of a housing market. The purpose of bubble indicators is to be able to use them as warning signals with some kind of ability to predict a house bubble. Absolute prediction power of bubble indicators has never been empirically proven (Lind, 2009; Sjöling, 2012), but they can still be used as complementary tools to evaluate the state of a housing market.

Despite Lind's discontentment towards Stiglitz' definition of a bubble much recent research on house bubbles has its origins in his definition (Lind, 2009). According to many researchers expectations have a key role in defining and explaining a bubble but it is not only expectations about future price increases that is mentioned in Stiglitz' definition that can affect price. Quigley (2001) concludes that expectations about fundamentals affect property markets. Case and Shiller (2003); Shiller (2007), finds that understanding the motivation of the buyers and the expectations they have on future price is the most central when predicting a house bubble. The buyers' and potential buyers' (further on included under the term buyers) behavior can reveal some information about expectations but of course it is much harder to access and estimate that kind of information than market numbers, which is why studies often include and begin with a study of market numbers.

1.1.2 Housing Markets

Housing markets contribute a great deal to a country's national economy and housing is usually the biggest part of a household's wealth (Boverket, 2011). Housing markets are known as inefficient, which Case and Shiller attribute to high transaction costs making exploitation of the inefficiency restricted and expensive (Shiller, 2007). It is the characteristics of an inefficient market that makes the risk of a housing bubble possible. If prices were only driven by new information a bubble could not exist (Lind, 2009). The individual price pattern seen in different housing markets reflects the variability in the forces affecting price and include local and regional variables (Conefrey & Gerald, 2011). With the variety of variables, that is dependent on the housing market in question, a set of necessary factors causing a bubble to occur does not exists (Lind, 2009). "A bubble can never be explained by a single factor, but is the result of a number of factors." (Lind, 2009, p. 78) Hence, different market forces have to be combined when studying housing markets in order to gain result. As stated housing market are influenced by local characteristics affecting price and therefore the spread of housing bubbles used to be limited and not affect market simultaneously. However recently this seem to have changed as a large number of EU states such as Ireland and Spain, as well as the United States (US) have been affected by house market crisis that have caused significant economic instability (Conefrey & Gerald, 2011).

1.1.3 Comparing housing markets

The Nordic countries' housing markets have experienced a similar price pattern since the beginning of the 1980s, all the way to 2006/2007. They have also shared an increase in household debt level during the same period. The rapid increase of real housing prices started, in all four countries, in the middle of the 90's when inflation was low and slowed when higher interest rates were enforced 2006/2007, as a result of stricter monetary policies. In 2008/2009 housing prices in all Nordic countries were falling as a consequence

of the financial crisis (Boverket, 2011). After the financial crisis, prices developed differently in the Nordic countries. Between the fourth quarter of 2008 and the fourth quarter of 2012, price of detached houses in Norway increased by 32.5 percent and 11.6 percent in Sweden, while prices in Denmark decreased by 8.5 percent (SSB, 2013a).

Figure 1.2, shows the nominal price development of housing for the Nordic countries while figure 1.3, presents real increase in prices. Looking at the nominal price increases; Norway is seen to have had the highest increase in price but looking at real increase, Finland's price increase is higher and Norway is rather seen to have had the same price development as Denmark until Denmark's house prices kept falling while Norway's house prices sharply rose again. Figure 1.4 illustrates the Nordic countries' increase in real income, which can explain much of the increase in housing prices.

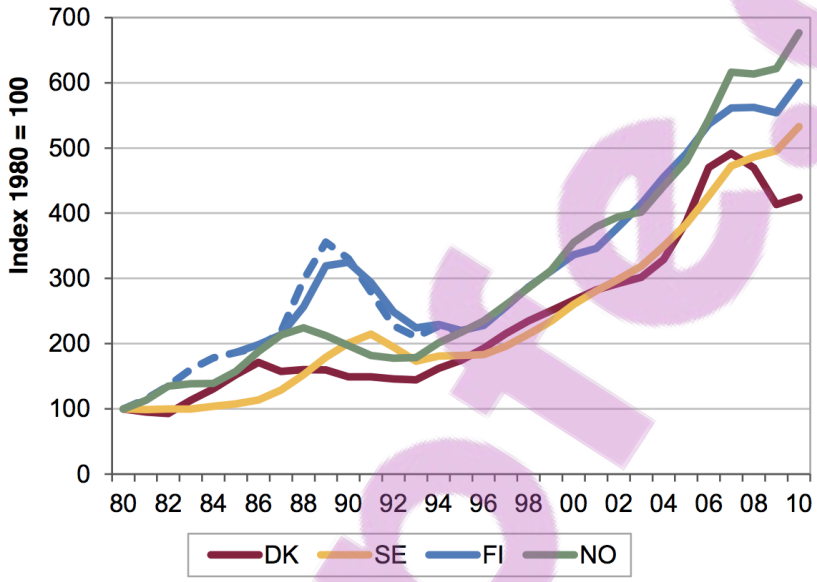

Figure 1.2 Nominal price of housing. Source: Boverket, (2011).

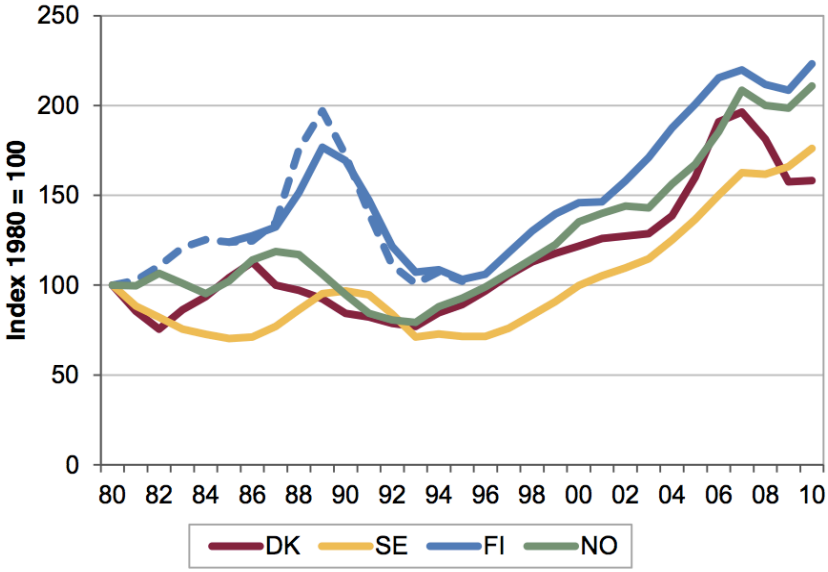

Figure 1.3 Real price of housing. Source: Boverket, (2011).

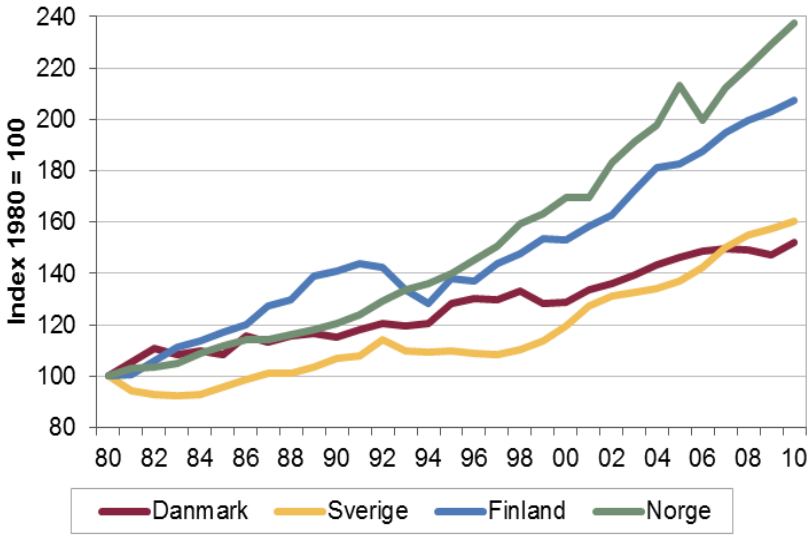

Figure 1.4 Real income. Source: Boverket, (2011).

In figure 1.5 Norway's change in housing prices are compared to the changes with, again Denmark and Sweden, but also Spain, UK and the US changes in housing prices. Except for Norway and Sweden, all the other countries in the graph have experienced bursts of housing bubbles, which have caused prices to decrease to a lower level than the peak before the bubbles burst.

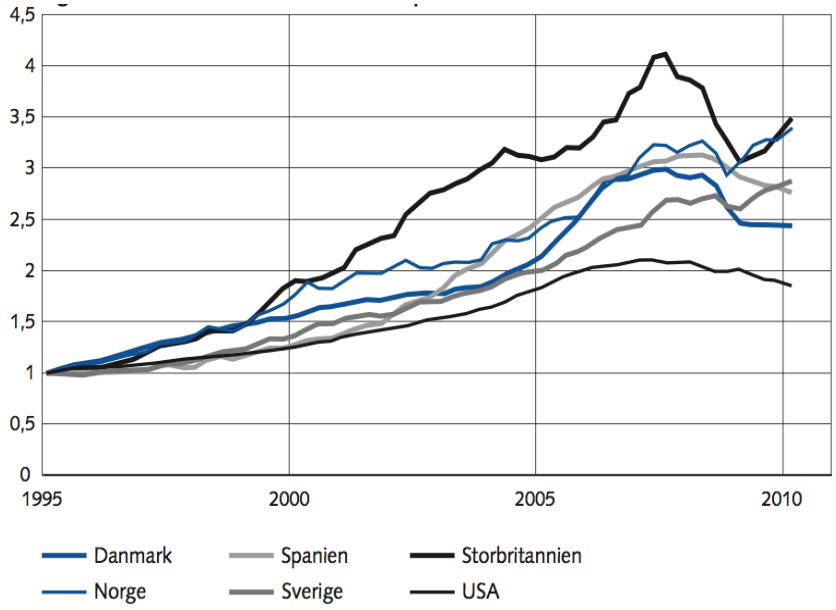

Figure 1.5 Nominal housing prices. Source: Englund, (2011).

1.3 Problem discussion

A relatively high number of housing markets in Europe, not far from Norway and with similar price pattern, have recently experienced housing bubbles. The explosive price boom, seen in Norway's housing market has been ongoing for over 20 years. This has caused increase in the debt level among household which have become an increasing burden to the country's economy and could in the future cause further damage in case of a change in Norway's economic stability. In Oslo the price increase has been among the most extreme and the question is what have caused the price to increase these last ten years after the price had already been rising sharply for over a decade. Can the price increase be derived from changes in macroeconomic variables or does a bubble exists in Oslo's housing market? From the definition of a bubble it can be concluded that in order to detect a bubble one needs to examine whether the fundamental factors can justify the price increase or if the price increase is built on irrational expectations. Observing changes in economic variables in the market is possible but it is hard to estimate the exact effect on price. As a complimentary tool to rate the state of a housing market, bubble indicators can be used. Finally, expectations despite being hard to evaluate, should be included when researching the possibility of bubble, as it is the main characteristic of a bubble.

This paper preforms a research of Oslo's housing market and makes a prediction of weather a house bubble exists. By researching various housing markets and the causes of price booms the awareness of factors causing bubbles and the effect of market forces will increase and hopefully in the future bubbles can be more easily avoided

1.3.1 Purpose

The purpose of this thesis is to describe the rapid price increase seen in Oslo's housing market between 2002 and 2012 by discussing and analyzing a number of underlying factors'

impact on price. This will create a greater understanding of what likely has caused the price increase, which will be used to evaluate whether the factors caused a justified price increase, or a price bubble.

To fulfill the purpose three research questions are stated with the purpose of guiding the study of Oslo's housing market onwards and help make a prediction of whether a housing bubble is likely to exist.

1.3.2 Research questions

- What has likely been the impact of the changes in common market variables that are known to affect price of housing, on Oslo's housing price, between 2002 and 2012?

- Further, what kind of indication does a chosen set of house bubble indicators give about the state of Oslo's housing market?

- Finally, would an examination of the behavior and beliefs of Oslo's housing buyers indicate any irrational market expectations, that could have affected price and contributed to a bubble formation?

1.4 Delimitations

First of all it should be stated that the research of Oslo's housing market is limited and the prediction is based exclusively on changes in economic variable numbers, a set of bubble indicators and a study of housing buyers' expectations of the housing market in Oslo.

This paper has chosen to focus on the price increase seen in Oslo over the last decade (between 2002 and 2012 or 2013 when material is available). For that reason a standardized timeframe for data collection have been sat to between five and ten years back in time. However, to be kept in mind, Norway's, thus Oslo's housing prices have been increasing for much longer than ten years, as seen in the introduction. Oslo has been targeted for the research, simply because price increase in housing usually are among the highest in capital cities and Oslo was proved to be no exception. Further, the study had to be limited to one single housing market as it would be difficult to study the whole country as one housing market when it in reality consists of many separated markets with different attributes and market forces. Finally, the last research question indicates that the irrational expectations of housing buyers, which include potential buyers, have a great impact on price and are therefore put in focus for this research. This does not mean that other actors in the market, like sellers, estate agents and different authorities cannot impact price as well but these actors are for the sake of the research extent excluded in this study. Further the buyers will be referred to as a group of people that act and think correspondingly, which is clearly a generalization. Finally the prediction of the state of Oslo's housing market will be made on the date of writing and no concern for how the market will develop in the future is included.

1.5 Method approach

The continued study of Oslo's housing market has its origins in the three research questions. These questions have created three areas of research on which the theory of this study and the rest of the thesis are based, namely economic variables affecting the housing market, housing bubble indicators and behavioral finance - the theory on which market expectations are formed. Despite the division, the three areas of research are not strictly separated; rather they overlap. It is the aggregated result of the research question, when studied together that brings value to the study and fulfillment of the purpose.

Examples of economic variables affecting housing price is found in most research about housing markets and bubbles: "The linkage between the real estate market and the general conditions of the economy has been studied extensively." (Quigley, 2001, p. 129) In those kinds of researches the study will have its start.

The notion of including a section of bubble indicators has its roots in Lind (2009)'s study of price bubbles in housing markets where he develops a (uncompleted) list of indicators. Most of the chosen indicators used in this study are taken from his work, supplemented with information from other sources as well, as the use of indicators when researching house bubbles are not a new method.

Noticed from Robert J. Shiller's many researches was how central psychological expectation is in explaining price increases and therefore he has influenced much of the research in that area. He argue that the field of behavioral finance have received little progress because it is against the view of many economists who prefer to rely on number, that price is affected by psychological factors and peoples' behavior (Shiller 2007). This point of view has led to the introduction of behavioral finance into the study. The measurement of market variables resembles a great part of this research but a lot of emphasis is also put on the housing buyers' behavior, hence behavioral finance. The theory explains how expectations can be derived from behavior observed in markets and common thoughts among investors. Expectations represent the unknown compared to economic variables that are more observable. It is also the expectations that separate a bubble from a justified price increase caused by the macroeconomic, fundamental factors and therefore the focus on behavioral finance is validated.

Much of the research process has lead itself forward as the research of one source leads to a number of other sources and so forth. However, Case and Shiller (2003)'s work has highly influenced this study as their research was based on market variables and an analysis of buyers' expectations, similar to this study.

1.6 Disposition

Chapter 2: The following chapter will discuss the theory, which has influenced most of the continued study. The theory chapter contains three main sections each based on one of the research questions.

Chapter 3: In the third chapter the chosen method used to fulfill the purpose is given. The research questions are researched separately and an adapted method used to answer each one of the questions is presented in this chapter as well as the used method techniques.

Chapter 4: The fourth chapter contains the main findings and interpretation where the result is connected to the theory given in chapter two. The chapter holds the information given from the study of the three research questions, which are presented respectively in three parts.

Chapter 5: The fifth and final chapter present answers to the three research questions based on interpretation of the result given in previous chapter. The conclusion, the main content of this chapter that fulfills the purpose, is derived from the question's answers. The chapter ends with critical reflections on the preformed study and suggestions for further research.

2 Frame of references

This chapter presents the theory on which the empirical study is based. The result gained in the research has been analyzed in the light of the presented theory. The theory chapter has been divided into three main sections, based on each of the research questions.

2.1 Economic variables affecting the housing market

Each one of the economic variables of this study and their effect will be presented below. Initially a clarification of fundamental value will be given.

2.1.1 The fundamental value

The interest for fundamental value evoke because of its central role in Stiglitz' definition of a bubble. Stiglitz (1990) is aware that fundamental value of an asset is difficult to assess since it is derived from an estimation of end value and one can question how economists test whether the terminal price can be justified by fundamentals, without having data extended into the future. The uncertainty of an assets fundamental value is what usually influences the debates among researchers who argue the possibility of a bubble (Lind, 2009). These debates are usually influenced by disagreements of whether a bubble exists. The crash of the stock market in 1929, which most economists agree was a bubble is an example of this; even after the crash there were claims about the prices being a product of fundamentals and the expectations of price being justified (White, 1990). Hence, the fundamental value of an asset can be hard to derive and naturally changes over time, as future events are always uncertain. Yet, to the extent possible assets should represent pure fundamental values otherwise the efficiency of resource allocation in the market is weakened (Stiglitz, 1990).

The change in an assets value can be derived from changes in in economic conditions, which will be studied in this part of the theory. Yet, with an ever-changing market it is hard to measure the exact effect of these variables on the price, as well as to understand the effect of new macroeconomic variables (White, 1990). Furthermore, Oslo certainly has a unique set of market conditions that effects demand and supply of housing, hence the price, which are not all mentioned here. Following this clarification of fundamental value is a presentation of common economic variables used in this research. The presented macroeconomic variables belong to the most common universal factors used to explain price changes, found in the used research material.

2.1.2 Construction costs

For a long time the general view among economists was that housing prices were driven primarily by construction costs. This was also true in the old days as hosing basically was the value of constructing the house, just like any other good. At that time nobody bought a house as an asset believed to increase in value (Shiller, 2007). Construction cost naturally affect the supply of housing but previous research has shown that construction cost does not necessarily correlate with housing prices as much as other macroeconomic variables

(Englund, 2011). However, changes in construction costs are still used to explain part of price increases in housing but it is argued that the increased productivity implied by a housing market that is experiencing a boom in prices should be able to keep costs down (Sjöling, 2012). The biggest part of construction cost usually consists of the labor cost, which therefore is an important factor (Shiller, 2007). Laws and regulations of the housing market affect constructors, and as well as buyers they are dependent on loans from creditors (Quigley, 2001). A complication with the house-building sector is that when the market is working at its full capacity the cost of increasing housing is much higher than the normal average cost of building one piece of housing. If demand is sustained the constructors in the market should have time to adapt depending on flexibility of the construction sector. Yet, it can affect price of housing in the short run (Englund, 2011).

2.1.3 Income and interest rate

Increased level of income is one of the most common explanations for price swings seen in housing markets (Case & Shiller, 2003). Exceptions of price booms without much increase in income exist but most of the previous studies have shown that prices in housing is highly responsive to changes in income and income is generally what controls demand for housing. The elasticity between income and price, based on previous research made, are usually around one (or above), which means that an increase in income of one percent should lead to an increase in price of at least one percent as well. The demand for housing is however not as elastic in response to price changes as it is to changes in income, which can increase the effect of income change on price even further (Englund, 2011). The reason can be that prices are expected to move up-ward and are therefore slow to change direction (Case & Shiller, 2003), therefore buyers do not respond to the price increase by buying less housing. Further, buyers can somehow be attracted to high prices as they see housing as a saving plan and an investment that could lead to a next, even bigger house (Englund, 2011).

The demand for housing might not be very responsive to price of housing but instead to the cost of housing. Interest rate is the biggest part of the user cost of housing, the cost of owning a house (Quigley 2003). Except for interest rate, user cost depends on income tax rates, capital gains and inflation. Interest rate together with income is what makes housing more affordable. If interest rates are falling while the price of housing is rising the interest paid might remain the same (Case & Shiller, 2003), hence the cost of housing has not changed and therefore falling interest rates can cause housing prices to increase. The purpose of lowering interest rates is to increase the incentive to invest (Shiller, 2007). Housing investments have seem to be very responsive to lowered interest rates, as housing not only increases wealth but also brings quality of life benefits, (Case & Shiller, 2003), opposed to other investments. Mayer (Case & Shiller, 2003) discusses how interest rates affect price more today, which also implies that housing markets are more vulnerable to increases in interest. He further points out that lowered interest rates even caused housing prices in the US to increase during the beginning of the 2000-century when the county was in recession (Case & Shiller, 2003).

2.1.4 Employment and population growth

Unemployment along with income should have direct effect on the price of housing

(Englund, 2011). Economic theory also suggests population growth to be a contributing factor of increasing prices. However, when tested on real cases, population density showed little correlation with price. Yet, this could be a more dependent factor in areas where land and supply of housing is more inelastic (Case & Shiller, 2003). Areas with high population density usually solve the problem by building vertically and investing in public transportation systems that can synchronize suburbs with city areas. Immigration is part of the population growth, hence affects the demand for housing (Shiller, 2007). Immigrants are often attracted to markets that are growing economically due to those markets demand for labor (Conefrey & Gerald, 2011).

Employment growth has shown higher correlation with price than population growth but not nearly as much as interest rate and income. Price changes often occur even when employment rate is steady. Rising house prices can have negative effect on employment as the region become less attractive for workers whose cost will increase (Case & Shiller, 2003).

2.1.5 Supply of housing

Many results from previous studies show that the supply of housing is highly relevant in explaining the price of housing. According to basic economic theory supply should adapt to increase in demand. Thus, when price of housing raises, due to increase in demand the suppliers, in this case the constructors should respond by increasing supply. This is usually the case (Case & Shiller 2003), but the elasticity of supply has been seen to differ between housing markets. In Sweden for example, prices in housing have been increasing. The supply has however, been observed as very slow in responding to the increased demand with the consequence of prices rising further due to the shortages in supply. In the housing market of Spain, US and Ireland on the other hand, the increased price lead to booms in the building sector, which instead caused housing prices to fall (Englund, 2011). The elasticity of housing supply (and land supply) is a key factor, affecting price of housing because if supply does not manage to keep up with the increased demand that comes from changes in the variables discussed above, then a very steep price increase can be expected (Englund, 2011).

Mayer (Case & Shiller, 2003) explains that if supply were perfectly elastic, price of housing would be driven only by the sum of construction cost and the opportunity cost of land. In the short run supply of housing is always very inelastic due to the lead-time involved in developing new housing. Other than that supply elasticity is dependent on the building sector's flexibility and costs. In a housing market where supply is inelastic an increase in demand will have much bigger effect on price. The number of new housing explains the response in supply (Englund, 2011), but also the number of housing starts can be a proxy for supply restrictions (Case & Shiller, 2003).

2.1.6 The effects of macroeconomic variables

When looking at all the different macroeconomic variables it is easy to see that one should be careful to not overemphasize bubble stories by only looking at the price movements of housing. There are many macroeconomic factors that can effect price changes (Shiller, 2007). Studying the underlying factors behind the variables enhances the notion of how

dynamic the housing market is. Income does not only affect price of housing on the demand side but also on supply side by being a big part of construction cost. Interest rate similarly does not only affect the buyers' affordability of buying a house but also the constructors affordability in constructing one. The central banks have a great responsibility in this area as monetary policies have a vital role. They control the interest rate levels, which affect the lending rate and discount rate (Shiller, 2007). Sudden tightening of monetary policies has also been seen to cause bursts of existing bubbles (Shiller, 2000).

2.2 Bubble Indicators

Unlike the macroeconomic variables that presents explanations to price changes, the indicators focus on signs that would indicate price increase caused by other, irrational factors, which have affected the behavior of actors in the market (Lind, 2009).

There would be a huge success if indicators with absolute certainty could predict a house bubble. So far we have to use them as warning signals of whether a housing market with a rapid price increase is in risk of facing a bubble. As it has been concluded that bubbles arise from a number of interacting factors (Lind, 2009), a set of indicators instead of just one, which would have little or zero ability predicting a bubble will be used. The presented list of indicators below is mostly based on indicators found in the research of Lind (2009). Lind gathered material by reviewing literature about house bubbles with the goal to create a broad set of indicators. Some indicators from other sources been added and some of Lind's indicators have been excluded because they are either covered in the section about economic variables or in the next section on behavioral finance. The remaining indicators that are brought forward below are the price-to-rent- and price-to-income ratio, followed by indicators of unstable lending, which include interest payments in relation to income. Finally indicators regarding speculation and irrational buyers are covered and those final indicators have a natural connection to behavioral finance that will be studied in the following and final part of the theory.

2.2.1 Price-to-income and price-to-rent ratio

The relationship between home prices and income should be rather stable over time. Volatility can assume a more unstable housing market. As price is very responsive to changes in income the ratio most often correlate or will soon fall back to a correlated level (Case & Shiller, 2003). The price-to-rent ratio should under normal conditions also be stable over time (Shiller, 2007). A deviation from a historical level where price have increased more than rent, implies expected future gains of the property whose price have increased. The question that follows is whether the buyer is right in anticipating this future increase in price. An increased level could however be explained by a decrease in the cost of buying or a house, referred to as a decrease in interest rate (Englund, 2011).

2.2.2 Indications of unstable lending

The credit market plays an important role in the housing market and risky financing as well as easy credit can be contributing factors in creating a bubble (Lind, 2009). In previous studies of housing bubbles the credit market's lending policies have often been accused as a

contributing factor of bubble formations. According to many economists the ability to borrow money, already in the 1929's stock market bubble, encouraged irrational speculation (White, 1990). The real estate bubble in Sweden in the 1990's was also associated with banks' generous lending policies (Lind, 2009). However, White (1990) concludes that it was the stock market's demand for funding in 1929 that affected changes in other financial markets and not necessarily the opposite.

A hazard in the banking sector occurs when the lending institutions undertakes excessively risky investment for self-interest reasons. It is therefore important that there is free competition and transparency in the credit market as well as regulations from state authorities (Quigley, 2001). Alarming is also when banks start judging buyers' credit worthiness more liberally. The risk of a bubble is said to be larger when households choose riskier investments. An extreme case of this is the subprime lending, used in the US, where interest payments and amortization was reduced the first year. Less extreme and more common is to choose interest that follows the current market rent at a time when interest is low, which is also riskier. A way of measuring banks' lending policies is through a look at loan-to-value ratio, the level of loaned capital in relation to the value of the house, which is applied to house buyers when taking a loan. This ratio should not increase during a boom when housing prices are increasing, rather it should be lowered in a time of increasing prices (Lind 2009).

2.2.2.1 Interest payments in relation to income

The risk of a house purchase on the buyer's economy is represented in the effect it has on direct expenditure. Interest costs are a large part of the household's expenditure and a possible bubble indicator is the relation between the nominal interest payments of the average house owner and their income. If this is significantly higher than in earlier periods, the behavior might be unstable and indicate a bubble Lind (2009).

2.2.3 Indicators of speculation and irrational buyers

In the long run the markets should be determined by rational factors, by factors that knowledgeable actors take into account. If during a certain period with increasing prices it is observed that irrational factors are affecting the behavior of the actors then there is a higher probability of an unstable outcome on the market. Apprehensible indicators of this could be when buyers are entering ownership at an earlier age or choosing riskier financing alternatives. These examples of irrational behavior, which affects the price of housing, would then be seen as bubble indicators (Lind 2009). Irrationality and non-efficient markets are discussed in the third section of the theory, as the buyer behavior on the market will be studied and researched separately and in greater detail but below are a short review of what kind of behavior that could indicate a bubble in the housing market.

Changes in the level of homeowners compared to the level of tenants in the market can reveal whether the demand for owned housing has gone up in relation to renting. Shiller (2007), observed how the level of homeownership increased in the US and stated that this was encouraged by society since there was a general view that owning a house was much better than renting one. At that time however, people were also encouraged into risky investment in order to become a house owner. The level of excitement that influences the house market can also reveal some information about the state of market. Word-of-month

and the general amount of talk could be seen as indicator in itself for the excitement level in a housing market (Case & Shiller, 2003).

Speculation is known to drive up prices extremely fast and affects most financial markets. The housing market has been unaffected by this type of investor behavior, due to the high transaction cost when buying and selling a house (Shiller, 2007), at least until a few decades ago. The tendency to view housing as an investment has become a defining characteristic of a housing bubble. An indicator of this type of speculating behavior is when an increased number of people are selling the house they just bought rather quickly (Lind, 2009). People are then buying for the future price increase and not for the pleasure of owning a home. It leads to instability in the housing market, as the prices will drop sharply when the investment motive fades. Housing is often seen as a risk-free investment and in combination with speculation there is a risk of irrational people entering the market, increasing the probability of fatal consequences on the housing market. Indicators that signal urgency among house buyers who are afraid to wait can also be interpreted into irrational belief in the housing market. This belief could e.g. be that prices will increase so much that buyers think they will miss out on an opportunity to buy later and therefore cannot wait any longer, which is also connected to speculation behavior (Case & Shiller, 2003).

Illogical buying motives, irrational future expectations and skewed perception towards risk are major signals of a bubble but these are less tangible, which is the reason for using indicators that translates these into actions observed in the market. Still, these can of course lead to different actions in different housing markets and this is a limitation of using indicators, which is the reason why behavioral finance is studied next.

2.3 Behavioral finance – Human behavior's effect on housing markets

In general, economists like theories that consist of models, rules and a number of assumptions. Therefore it has taken a time for behavioral finance to receive recognition; "The field of behavioral finance is still in its infancy." (Shleifer, 2000, p. 27) Shiller (2007) states that even though interest rates have an upward effect on home prices monetary policies are not as central as psychological expectations in explaining price increases, which is against the view of many economists. Supply is meant to stabilize house prices but the effect of increasing development of housing can easily diminish if the expectations remain high.

Behavioral finance is the study of human behavior in competitive markets. Shleifer (2000) describe this behavior as human fallibility but as unreliability and faultiness is seen as human characteristics it is natural consequence that human behavior will affect any market. To understand the true nature of the forces that effect price changes on a given market we need to turn to psychology (Shiller, 2000). It will help understand what influence people's expectations, motivation and behavior. The study on the formation of buyers believes could go deep into endless psychological theories in order to fully understand the cause of an action. This study however, will settle with the most fundamental ideas of behavioral finance.

2.3.1 Market inefficiency and word-of-mouth

A market is called efficient when the price of an asset in the market is kept close to its fundamental value. One of the conditions for the efficient markets theorem to hold is the existence of substitutes in the market. Behavioral finance questions this by pointing at the lack of substitutes making arbitrage risky and limited (Shleifer, 2000). Further, the theorem of market efficiency relies on rational investors that value assets and securities for its fundamental value. This rationality also involves immediate reaction to information, such as increasing prices when news are good and decreasing prices when news are bad. The efficient market assumption that people in general are fully rational is hard to sustain in any market and not just the housing market that was clarified earlier as an inefficient market. There are many investors that react on irrelevant information in forming their demand. They buy and sell based on noise rather than information. The market efficiency theorem has however accounted for some irrational behavior by stating that, irrational actions among investor clearly exist but since the behavior is assumed to be random the effect on the market is always cancelled out (Shleifer, 2000).

It is true that random actions have little effect on the market since significant market events generally occur if there is similar thinking among large group of people. Because of humans' information processing ability; the effective communication of important facts from one person to another, similar thinking among people is not unusual. In a modern society there is likely to be rapidly spreading conversations about a buying opportunity for a hot asset or about threats of personal wealth, etc. The controversial media, the print media, television and radio have also profound capabilities for spreading ideas (Shiller, 2000). A notion that helps develop a bubble in particular is stories that justify the price increase seen in the market. Shiller (2007; 2000) refers to them as 'new era stories'. These word-of mouth stories and spreading of ideas explains why the deviation from rationality studied in behavioral finance, has turned out to be far from random but instead highly pervasive and systematic, which is against the assumption of market efficiency theorem (Shleifer, 2000). This kind of systematic deviation from rationality is surely a key in explaining a bubble and will therefore be discussed further.

2.3.2 Irrational price expectations

A fundamental observation about human society is that people communicate regularly with one another in similar ways. At any place and in any time there is a 'Zeitgeist', a spirit of the times. Understanding this similarity of thinking at a given time and place can help create an understanding for the fluctuations that attribute price pattern caused by human behavior (Shiller, 2000).

People deviate from the standard decision-making model in a number of fundamental areas. One area is illogical expectation formation, the prediction of uncertain outcomes. It has been studied that people often predict future uncertain events by looking at short history of data (Shleifer, 2000). People tend to make judgments in uncertain situation by looking for patterns and then assume that future patterns will resemble past ones without questioning the reasons for the pattern or the probability of the pattern repeating itself (Shiller, 2000). This way of identifying patterns is common among humans who like to simplify complicated information. A consequence of such behavior is the bad decisions made on the simplified information. Potential buyers may generalize short past histories of rapid price increase far into the future and therefore overprice assets today. People see

patterns in truly random sequences and overreact to positive news. Shleifer (2000) states; "Prices are high because investors expect them to go even higher, not because they are ready for prices to go down." (p. 179) With this expectation the willingness to bear risk increases, which drives prices further up. In reality a history of high growth is unlikely to repeat itself (Shleifer, 2000). High expectations on price also have a tendency to become self-fulfilling (Englund, 2011).

People have a propensity to base their belief of what indicates the appropriate level of the market prices on numbers already given in the market. Hence, the price tomorrow will be based on the price of today meaning that whether price is over or underpriced in people's minds depends on prices already expressed. This also explains why individual stock prices move together and are more influenced by other stocks with headquarters in the same location rather than in the same industry (Shiller, 2000).

2.3.3. Over-confidence

There seem to be a general human tendency toward overconfidence in in one's own beliefs. People are ready to act on stories or reasons that rationally they should have little confidence in. People think they possess more information than they do. They like to express opinions on matters they know little about and they often act on these opinions. Further on people tend to overestimate the probability that they are right and investors have been shown to express overly strong opinions and rush to summery judgments. Another theory is that people make probability judgments by looking for similarities to other known observations, and they forget that there is much other possible observation with which they could compare. A consequence of overconfidence is the tendency to believe that one would have known actual events were coming before they happened. This is known as hindsight bias and encourages a view of the world as more predictable than it really is (Shiller, 2000).

A phenomenon in peoples mind, described as conservatism states that individuals are slow to change their beliefs in face of new evidence. If they react the reaction is not as strong as the response should have been (Shleifer, 2000). It takes some time before people begin to conclude that in the light of new evidence; the trend has changed and will continue in another direction (Shiller, 2000).

2.3.4 Herd behavior

The judgment of people's opinion and behavior is not fully independent, which have been proven in many psychological experiments. If the majority of people have a certain belief other people tend to follow that belief based on the simple conclusion in peoples' minds; that not all other people could be wrong and thus, their own senses are somehow not reliable. Another example of such heard behavior is when people only listen to experts without questioning (Shiller, 2000).

2.3.5 Consequences of the human behavior on housing markets

As stated, similar irrational thinking is not an unusual phenomenon rather it is observed as common that a large number of people in the same environment react alike to identical

information. Similar thinking can have effect on booms and busts in markets (Shiller, 2000). Hence, when similar irrational thinking affects a great share of the people in the same market the risk of a bubble formation increases.

In accordance with the study of how people anticipate further growth on assets based on past growth, homebuyers in cities where prices have increased rapidly in the past anticipate greater future price appreciation than in cities with no or stable growth. The research by Case and Shiller (2003) proves this statement. Homeowners in so-called bubble states, were prices had already increased significantly, were anticipating further large price increases in housing and larger increases than states with lower price increases. In the same way homebuyers have been known to irrationally expect the current low interest to last in the future. During a bubble period in the housing market people believe in prices continuing to increase as in recent years or that prices will stabilize on what is a very high level from a historical perspective. In this state of mind households underestimate the risk of house investment as close to risk free (Lind 2009).

During a period of rising prices on a housing market people might become impatient, thinking that cost will keep increasing and the desire to follow the rest in the market increases. Another example of herd behavior that is typical in housing markets occurs in situation when people perceive that 'everybody' in the surrounding is realizing their 'dream' of buying a house, with the given effect that people feel more motivated to do the same (Lind 2009). This kind of believes is naturally enhanced by word-of-mouth.

Prices in the housing market have been noted as sticky downwards. This is an example of conservatism in buyers' and sellers' minds as people are slow to change beliefs when given new information. The price of housing often stick to a certain price even if the market demand has gone down because the sellers have a reservation price, which they try do not fall under. This is connected to the belief among people in housing markets that price of housing never declines (Case & Shiller, 2003).

Understanding buyer sentiment and their deviation from rationality may generate more accurate predictions about price and returns, which can help to make markets more efficient. The progress of determining the asset prices is receiving further knowledge through behavioral finance as a valuable mean in predicting price. Yet, there is still lack of knowledge in the area of the key determinates of price such as expectations about fundamentals, discount rates, and simple movements of demand. The behavioral finance has yet many years to grow. In the future maybe attitude towards risk, forecasting and movements of uninformed demand can be used in a higher degree to explain the value of an asset (Shleifer, 2000), which would improve the possibility of predicting bubbles.

3 Method

This chapter presents the method used to create an understanding for the cause behind the price increase seen in Oslo's housing market. The purpose of the method is to create a path that in the end leads to the conclusion of whether the price increase on Oslo's housing market is believed justified or a price bubble is to be suspected. The method will begin with a look at the purpose of the research. Then the research philosophy and approach is discussed. This will be followed by a debate about the quantitative and qualitative data collection, which is continued with a description of the method used to solve each research question. The chapter ends with looking at how validity and reliability of this study is secured.

It is the purpose of this research that decides whether explorative, descriptive or explanatory research is to be used (Yin, 1994). This study initially wants to describe the price increase seen in the market. However the main purpose of this study is to explain the relationship between the price increase of housing with some observed changes in the market, which represents an explanatory research (Robson, 2002). Thus, this research will be mainly explanatory.

3.1 Research philosophy and approach

With three research questions guiding the study it was difficult to choose one appropriate research philosophy. The positivist ontology has its roots in natural science where an objective study based strictly on facts should be made, without including personal impressions (Saunders, Lewis & Thornhill, 2007). It was difficult, mainly because of the third research question that includes impressions and different interpretations of the housing buyers' thoughts and behavior, to only touch upon facts in this research. The different areas of the research questions imply that neither positivist nor pure interpretivist ontology is the appropriate research philosophy for this study. In cases like that the applicable research philosophy to choose, which uses both ontologies is the pragmatist view (Saunders et al., 2007).

The study of Oslo's housing market will take on mostly a deductive approach, as a main characteristic of the deductive approach is to explain relationships between different variables. However, the deductive approach calls for a structured research (Saunders et al., 2007), and the study's outcome should either confirm the theory or create a modification to the theory (Robson, 2002). This is not in line with this study's aims. Yet the alternative; the inductive approach is a study that wants to develop means that can help create a theory (Saunders et al., 2007), which is even further outside the frame of this research.

3.2 Quantitative and qualitative methods

A main question in the method choice was to determine whether a quantitative or a qualitative method should be used. Quantitative research method, which is influenced by the researcher being in control and beforehand determining possible results, is highly associated with the usage of statistical data (Holme & Solvang, 1997). Therefore the quantitative research approach fits the study that the author wants to perform, at least partly as market numbers are a big part of the study. However, the purpose of this thesis

also concerns a high degree of understanding, which symbolizes a qualitative research approach. Nonetheless, qualitative methods can be made systematically with quantitative influences. A qualitative approach aim is to create an understanding while a quantitative approach wants to explain (Holme & Solvang, 1997). This study tries to do both, which have led to a mixture of both qualitative and quantitative methods being used as an overall method approach. In the end qualitative data creates an overall picture of the research area and an increased understanding (Holme & Solvang, 1997), in line with the aim of this research. Thus, this study strives towards a qualitative result that is gained through the usage of both using qualitative and quantitative methods.

The numbers and graphs used, represent the quantitative approach, even if no statistic calculation has been performed. The statistical data is based on premade numbers and statistical data gathered mainly from Statistisk sentralbyrå (Statistics Norway, SSB). A graph representing the price increase of housing since 2002 initiates the empirical study to visualize what the following study wants to explain.

The qualitative information in this thesis is almost exclusively obtained through interviews with real estate agents.

Since the solution to the problem of this thesis relies on the three research questions, which require adapted research, a method for each question will be given respectively. Each method has been used as a tool for gathering the desired information in order to solve the problem and contribute to some new knowledge, in accordance with the function of a chosen method (Holme & Solvang, 1997).

3.3 Question 1 – Market variables

In order to judge whether the price increase in housing in the last decade can be attributed to changes in the market variables, different variables are presented in graphs, representing their annual changes between the years of 2002 and 2012. Unfortunately some variables' data for 2012 were not compiled yet and consequently the final data is from 2011 instead. Data representing the following variables have been collected:

- Changes in construction costs
- Income development
- Interest rate levels on property loans
- Unemployment and employment numbers
- Population growth, and
- Housing supply development.

The interest rate, income and construction cost increase have not been deflated as the price increase of housing was given in nominal terms and because the inflation has been rather low in Norway. The average inflation rate in Norway, between 2000 and 2011 was around two percent (SSB, 2013b). Interest rate represents part of the owner cost of housing, which also includes tax as stated in the theory. However, in Oslo there is no property tax to take into consideration (SSB, 2013c), interest rate will therefore in this study represent the full cost of housing. Employment statistics was only available from 2006 and the unemployment figure will be complemented with a few other countries' unemployment rate for reference and to enhance the understanding of Oslo's level of unemployment.

Housing supply is given in number of completed dwellings and number of started dwellings, both in relation to population, as the amount of increasing supply otherwise would be less interpretable. Interpretation of the variables will be performed continuously as the graphs are presented but an overall interpretation of the aggregated effect of the changes in the market with respect to the given theory comes after the presentation of the variables.

3.4 Question 2 - Indicators

The indicators' that were tested on Oslo's housing market are mostly presented over time, for comparison reasons. The results are partly presented in graphs and partly in tables with exception of the indicators regarding the credit market that are briefly discussed, while that information is not just given in just simple figures. The indicators listed below are the ones that have been tested on Oslo's housing market:

- Price vs. income and rent
- Price-to-income ratio
- Price-to-rent ratio
- Number of homeowners vs. tenants
- Age of entering home ownership
- Interest payments in relation to income
- The credit market, loan-to-value ratio

Data is gathered from SSB, but supplemented with information about the banks' lending policies from Finastilsynet's webpage. Since housing markets are very heterogeneous it will not give much result to compare the indicators to standardized indicators from other housing markets. To gain result the indicator have in the same way as the economic variables been compared over time to see if the market has made any remarkable changes towards an unstable housing market that would indicate a bubble. The timeframe is however, more flexible due to limitation in the statistical source's data, regarding some of the chosen indicators. The indicators will similarly to the variables be interpreted systematically as the indicators are given.

Some of the indicators mentioned in the frame of reference not listed above, involving excitement, word-of-mouth, buyer believes and motivations, which are hard to gain information about in statistical numbers, will be researched together with the rest of the study of the buyers' behavior in Oslo's housing market.

3.5 Question 3 – The housing buyers' behavior

The third question wants to gain access to the market expectation of Oslo's housing buyers, since irrational market expectations are said to be the cause of bubbles. "Survey evidence on people's expectations about future house price appreciation can therefore be a useful tool for diagnosing a bubble." (Norges bank, 2013, p. 4). It is the belief of this research that information about the buyers' market expectations can provide valuable information in itself, as well as to support and reflect on the information gained from the two previous research questions. With limited ability to gain access to first-hand

information about the buyers' expectations, real estate agents were targeted as the source of information about the buyers' behavior on Oslo's housing market. Thus, information about the housing buyers' possible motivation, beliefs and expectations has been collected through telephone interviews, made with a number of real estate agents in Oslo.

3.5.1 The survey

The used format in the telephone interviews was a standardized questionnaire, without any given answers to choose from. The first thought was to let the agents think of trends and behavior among the buyers without being directed into already given answers by using completely open-end questions. This kind of qualitative interviews are very flexible but the flexibility can also be a problem (Holme & Solvang, 1997). It was concluded that open questions would lead to too much varying answers with the consequence of little usable or interpretable information obtained. Therefore more standardized questions were needed to gain wanted information but it was still important that the real estate agents had the possibility to express their individual view and make comments. The interpretation of the answers is based on the theory of behavioral finance and the part of the bubble indication theory that involves irrational behavior among house buyers, which have also helped form the questions. The survey in itself was influenced by the survey Case and Shiller (2003), preformed in their study of the US house market.

3.5.1.1 Survey questions

The questionnaire, which can be found in appendix 1, consists of twelve questions. Possible attendant questions, marked with a hyphen were asked if the answer given was not sufficient or if the agent misinterpreted the main question.

In order to separate the agent's own beliefs about Oslo's housing market, from what the agent has interpreted as the buyer's belief, questions about the agent's opinions initiated the interviews to make the agent aware of her or his own views first (see question 2-4). Question 4, regarding the agent's opinion of when housing prices would fall, was asked to also to see if the housing market prices, according to the agents, are perceived as predictable. Question 5, simply enquires the buyer's beliefs and expectations regarding price and future price, while question 6 and 7 concerns demand changes. Especially question 7 that asks whether it is more common today with housing being sold above asking price, wants to tests whether the demand can be symbolized as irrational. Question 8 represents the buyers' view of housing as an investment as well as question 9 that asks whether the average owning time of housing has decreased since housing sold rather quickly after the purchase would indicate speculation among buyers. Question 10 concerns the buyers' appreciated risk associated with housing purchase and question 11 requests whether there are buyers who feel a sense of urgency to enter the market because of price expectations or any other expectations. Question 12, the final question wants to measure the general excitement that influences the housing market of Oslo. It brings up the word of mouth phenomena and inquires if there are any topic regarding the housing market that are the more frequently discussed.

3.5.2 The Selection process

The negative aspect of interviewing estate agents instead of homebuyers and recent homeowners directly is that the information about buyers' beliefs becomes secondary information. Hence, the view and interpretation of the agents will be added to the information. The positive aspect however, is that real estate agents are able to report new trends in buying behavior that they acknowledge over time, which the buyers themselves might not be aware of. They are able to see market differences in relation to former states of the market. Further, interviewing one real estate agent covers a high number of buyers and potential buyers. Even if an estate agent does not remember all people it is more efficient than interviewing or sending out paper forms for homebuyers to fill out. Getting in touch with these new homeowners is also much more difficult than it was to find contact information to real estate agents.

The selections of real estate agents were random with the exception of only targeting agents that have been working five years or more in the housing market to secure their trend analyzing ability. Unfortunately the response among women was lower for unknown reasons. A small amount of nine agents have been interviewed which symbolize a less distanced and more selective method than what is characterized in a strictly quantitative survey (Holme & Solvang, 1997), hence the information obtained in the interviews are foremost qualitative.

3.5.3 The result

In quantitative research, the information gathered is often translated into measurable numbers (Holme & Solvang, 1997), which have not been done with the information gathered in the interviews. Survey questions that showed a lot of similar response is seen as more representative of the market. The aim of the interviews was to be able to present a view of the buyers expectations in the housing market and for that reason the answers have been interpreted by the author in the light if of given theory, which is in line with a qualitative method approach (Holme & Solvang, 1997). The interpretation of the agents' answers is done successively as the interview answers are presented but a recap of the answers will be in the end of the result.

In a concluding analysis the interpretations and results gained in the three separated parts of the empirical study is analyzed. The three parts; the market variables, the indicators and the observed buyer expectations are analyzed with respect to one another and with respect to theory in order to reach a collective conclusion that fulfills the purpose.

3.6 Validity and reliability

Reliability of a study means that a comparable result would be gained if another researcher performed a similar research. This is difficult to sustain in a qualitative research like this, as you not only need to perform the study in the same environment but also during the same time (Bryman & Bell, 2003). As mentioned in the theory there is always a Zeitgeist, a spirit of a certain time era that is influencing the people. That spirit is part of what this study wants to capture, which will be hard to recapture at a later occasion.

The danger of using interviews as a source of material for the study is the great risk of the author, performing the interviews, being biased and influencing the interview participants.

This is a huge threat to a study's credibility and reliability (Saunder et al., 2007). In this study however, the interviews are just one out of three views presented about Oslo's housing market. Complementing with information taken from other sources increases the research's validity (Yin, 1994). Further, the market numbers that are used represent a sort of information that is more difficult to bias than the information gained in interviews.

Validity represents how accurately the research has succeeded to measure and describe the researched area (Bryman & Bell, 2003). In the study of different market powers' effect on housing price it has been hard to tell the exact effect they have had on price, unfortunately. In order to increase reliability and validity, real estate agents that had been working in the housing market at least five years were targeted. It ensured greater validity of the agents' answers. Further reliability was increased as the estate agent own beliefs were distanced from the buyers' beliefs in the interview questions.

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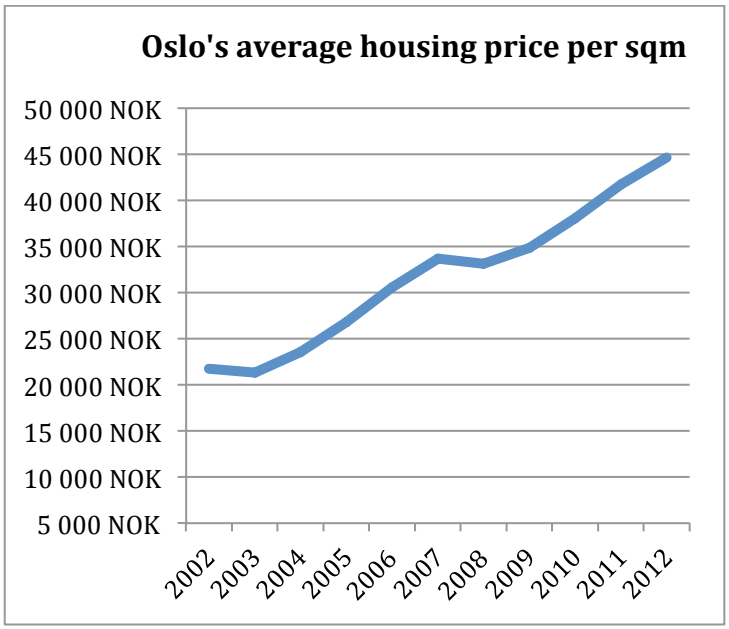
4 Empirical findings and interpretation

The empirical chapter consists of three parts. The three parts are divided after the three research questions, but all the same contain information about Oslo's housing market. It is also a natural lead in the task of trying to understand Oslo's housing market, to first look at changes in market variables. The second part presents the result from the housing bubble indicators and the third part will present the result and interpretation gained in the interview process concerning the housing buyers' beliefs, expectations and behavior.

Before entering the main findings of this research, a look at the price increase of housing in Oslo between 2002 and 2012 is given in graph 4.1, which is the time frame this study focuses on.



Graph 4.1 Oslo's average housing price. Source: SSB (2013). House price index. Table: 06035

4.1 Part I. Economic variables

The first part of the findings presents the changes in market variables observed in Oslo's housing market, which is given in a number of graphs. Further the economic variables are also interpreted in order to gain practical information.

4.1.1 Construction cost, income and interest rate

The three graphs below illustrates Oslo's construction cost development, income pattern and Norway's change in interest rate level during the last decade. These are given in the same order as just stated, in graph; 1.1, 1.2 and 1.3 respectively.

Starting with graph 1.1 representing construction cost development for the last decade it can be seen that construction cost has been increasing rapidly and fairly steady during this time. Compared with the price increase in housing in graph 1 above, construction cost development seem to correlate fairly well with housing prices except for the time housing prices were staggering between 2007 and 2008. Construction cost is not mentioned as one of the main factors affecting price increase but inevitably the price of housing has to at least cover the increased cost of construction. As seen in the graph the cost of construction have almost increased 50 percent during the studied time which certainly must have affected price to some extent.

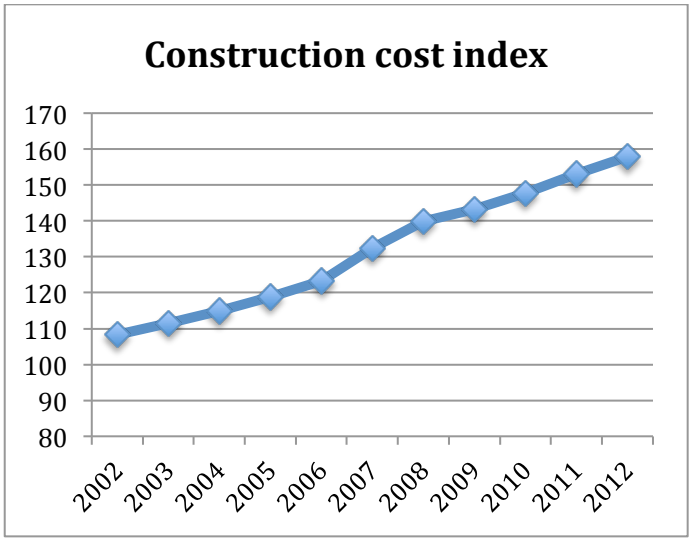
The increase in construction cost has been very similar over the years but between 2006 and 2007 the slope in the graph can be seen as slightly steeper. By observing the income development during the same time in graph 1.2 below, it can be seen that the increase in income between 2006 and 2007 was very high as well. Since labor cost is the biggest part of construction cost the increase in income can probably explain the slightly steeper increase at that time. Except for the fall in income in 2006 not resembled in the construction cost graph the income and the construction cost development can assume visual correlation. Some of the increasing construction costs can be explained with a sudden boom in demand for housing. Because if the construction sector were working at its full capacity any time before an increase in demand, an increase in workload would then increase the average cost of construction. According to the theory this should only have short-term effect on price as the supply is supposed to adapt to increases in demand. Instead it is argued that that an increase in productivity that is indicted by the rise in income seen in graph 1.2 should be able to keep construction cost down, which graph 1.1 show no evidence of. The theory also brought up how housing constructing industry were influenced highly by laws and regulations. It is possible that more laws and tighter regulations have contributed somewhat to the increase in construction cost. Decisively the increased construction cost seems, from the correlation with price, to have had bigger effect on price than what is implied in the theory.

Graph 1.2 that represents average annual income in Oslo fluctuates more than both construction cost and the price of housing. Yet, the overall change shows a decent increase in the average income, which is supposed to be the main factor, affecting price and therefore clearly can be seen as a contributing factor to the price increase on Oslo's housing market. However, the theory about income's effect on price mentions that the elasticity between income and price normally is around one, or more commonly above, which means that an increase in income is very likely to cause a price increase of at least one percent as well. Calculating the percentage increase in income using the numbers from the graph, gives an increase of around 30 percent between 2002 and 2011. The percentage price increase of housing during this time is over 90 percent, also calculated from the numbers in the graph. Hence, income might have contributed to an increase in Oslo's housing prices but it is unlikely to have caused a price increase of three times as much as any increase in income. Consequently there must be other explanations for the price increase seen in Oslo than just the income growth.

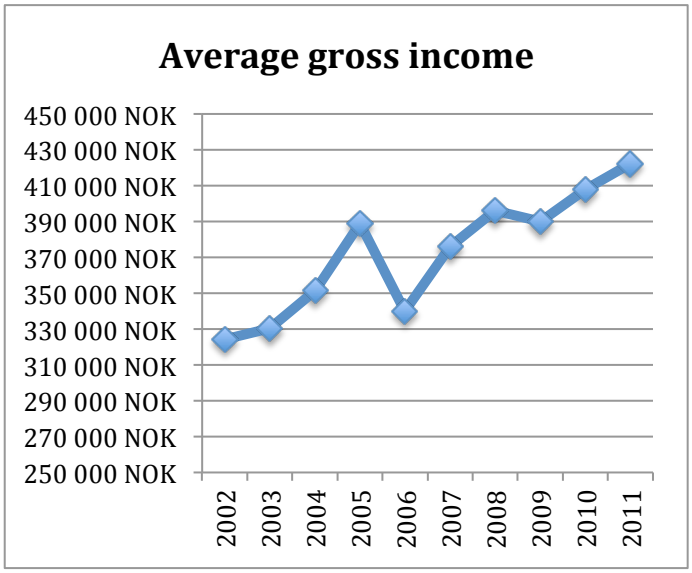
The income variable is said to have the highest effect on the price of housing and taking that into account the price of housing does not correlate as strictly as expected with the income graph since income decreased in 2006 while the price kept increasing steadily. This could further indicate that there must be other explanations to the high price increase in housing than just the income increase. It could be explained by the fact that income increase affect demand, hence price but price do not inversely affect the demand at the

same level, which is a bit confusing. Consequently an increase in income can cause the price to increase and if the price keeps increasing without an increase in income the demand does not necessarily fall, keeping the price up even at times when income is falling.

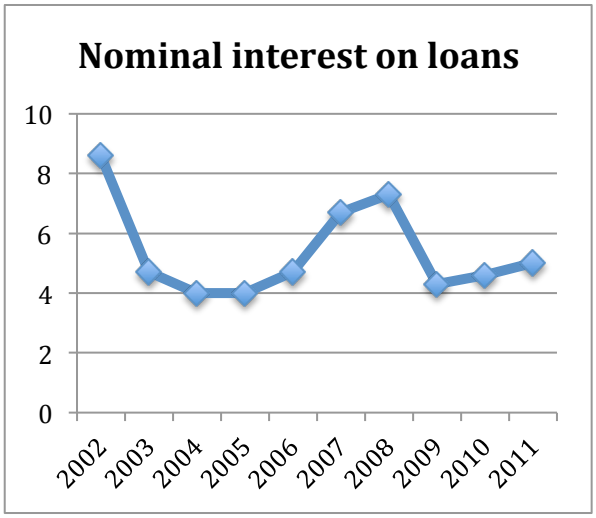
Graph 1.3 reveals the nominal interest rate level on loans. In the beginning of the decade the interest was lowered from 8.6 percent, by almost four percentage points to 4.7 percent and have been on a low level ever since. It was lowered also in connection to the financial crisis, after 2008 and according to Boverket (2011), that was a contributing factor to why housing prices were increasing so soon again after the fall in prices connected to the financial crisis. Low interest rates can be said to keep up the demand for housing and Norway has kept a low interest rate despite its booming economy because of recession in the global economy (Finanstilsynet, 2012). This certainly makes housing more affordable for the buyers but it is hard to specify how much it has affected price on housing, as it is not evident between the graphs if price react directly to lowered interest rates. After the decrease in the interest rate level between 2002 and 2003 the price of housing highly increased and surely the interest was a contributing factor at that time. After that decrease in interest rate level, it is however less apparent if there is any evident correlation between changes in interest rate and the price of housing in Oslo.



Graph 1.1 Construction cost. Source: SSB (2013) Construction cost index for residential buildings. Table: 08657



Graph 1.2 Average income. Source: SSB, (2013) Tax statistics for personal tax payers. Table: 03068



Graph 1.3 Interest rate. Source: SSB (2013). Average interest rate on loans. Table 454

4.1.2 Oslo's population and employment levels

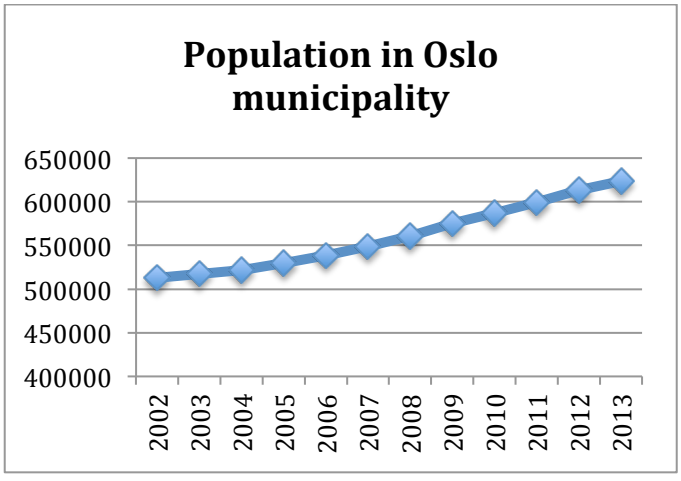
In the graphs presented below are the population growth, graph 1.4, the net migration, graph 1.5, number of unemployed, graph 1.6 and employment rate located in graph 1.7.

The steady increase in population seen in graph 1.4 symbolizes a growing city and a growing demand, at least in theory. Previous studies of population growth's effect on housing have shown little influence on the price of housing unless the population density is high and space is limited. In a capital city containing just above 0.6 million inhabitants, in a country with around five million inhabitants in total (SSB, 2013d), where the land area is above 0.3 million square kilometers (Central Intelligence Agency, 2013), space is hardly limited. Yet, the population growth correlates well with price and inevitably the growth in population has increased the competition on the housing market. It is still unclear to what extent it has affected price but like construction cost it looks like the population growth

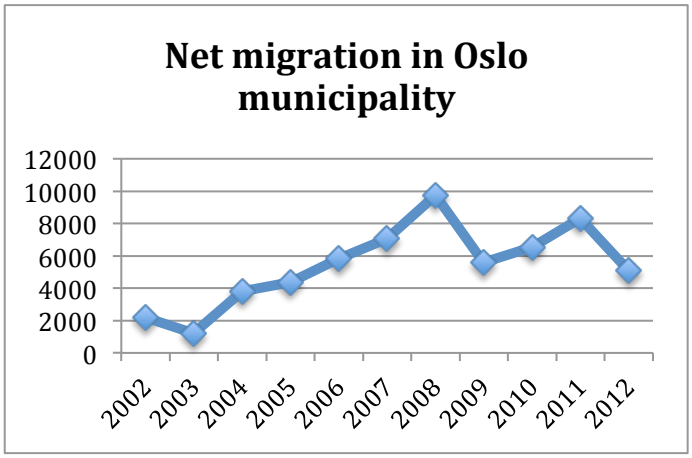
might have affected price more than what the theory suggests. However, the theory also reveals that in cities were space is getting limited this is usually solved by building vertically and increasing the accessibility between the main city and suburban areas. Maybe Oslo has failed to do so, which have caused the population growth to have bigger impact on price than it should have had if suburban areas for example were more available, hence more attractive to the buyers.

The net migration, seen in graph 1.5 shows more fluctuations. Immigration is part of the population growth but it can also be seen as an indication of a market's attractiveness. The immigration was growing for many years until 2008, which indicates that Oslo's attractiveness was increasing during that time. Foreigners can possibly have been attracted to Oslo for its prospering economy. Whether this has changed as immigration has decreased in the last years is hard to tell but price rises in housing are said to affect the attractiveness of a market negatively hence, possibly less people chose to not enter Oslo because of the high housing prices.

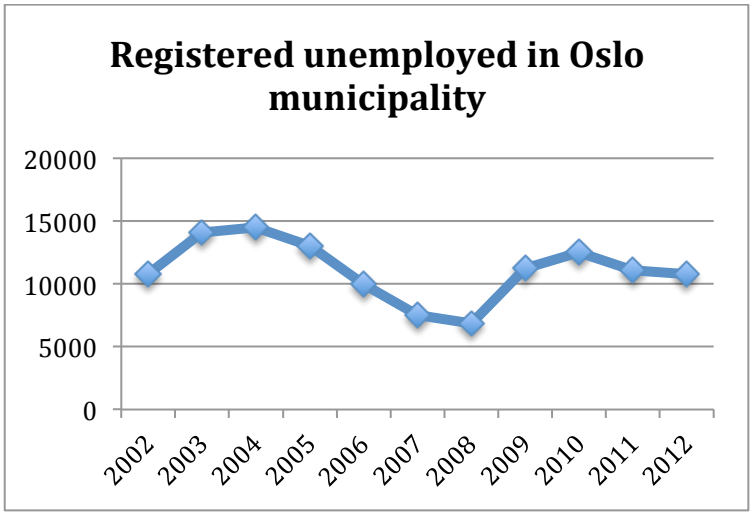
The number of unemployed in graph 1.6 shows a fairly steady number but past levels of unemployment used to be lower and the relationship between numbers of unemployed and the ongoing price increase is not evident. The employment rate in relation to population in graph 1.7 mirrors the unemployment graph very well as the employment use to be higher than today. Relatively speaking Oslo still has a very remarkable employment rate. Norway's total unemployment rate, representing unemployed persons as a percentage of the total labor force, was in 2012, 3.2 percent. The same year Sweden had an unemployment rate of 8.0 percent, Germany 5.5 percent, US 8.1 percent and Japan 4.3 percent to mention a few (Eurostat 2013). Oslo's estimated unemployment rate was 3.1 percent in 2012 (EURES, n.d). Hence, Oslo has a very high rate of employment that makes it possible for a bigger share of the population to afford housing. This keeps up the demand for housing but in Oslo's case the employment level have affected price less than what theory predicted. Perhaps this is because employment rate has not changed enough to have any affect on price.



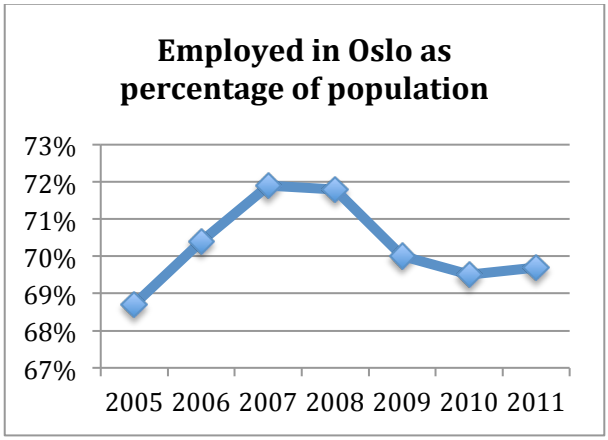
Graph 1.4 Population growth. Source: SSB (2013). Population changes in municipalities



Graph 1.5 Net migration. Source: SSB (2013). Population, net migration. Table 06913



Graph 1.6 Unemployment. Source: SSB (2013). Registered unemployed. Table 09314



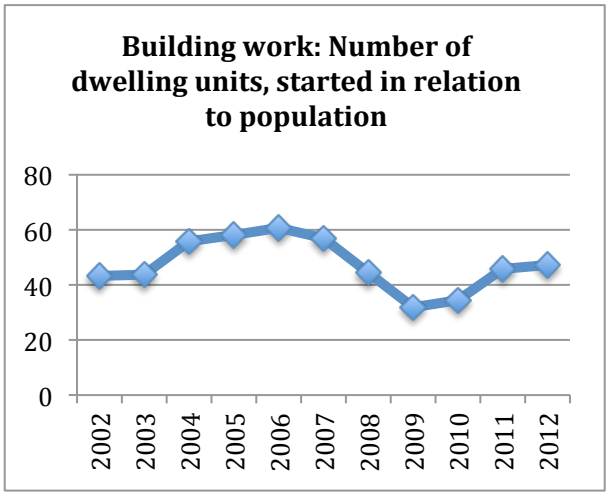
Graph 1.7 Employment. Source: SSB (2013). Sysselsettning registerbasert. Table 06445

4.1.3 The housing supply in Oslo

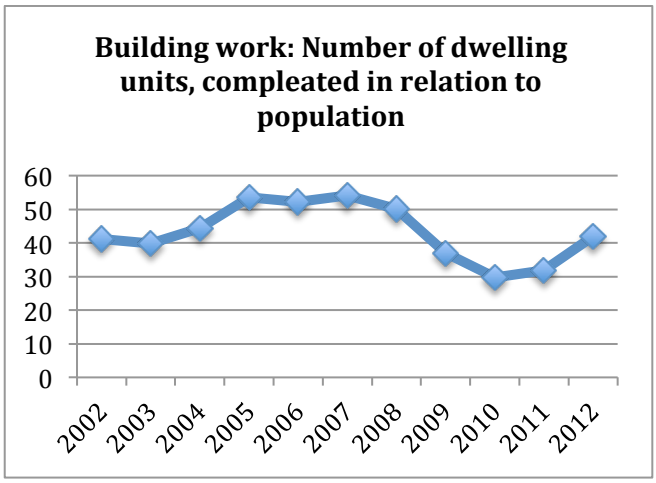
The supply is here represented in graph 1.7, number of dwelling units started in relation to population and in graph 1.8 that describes the number of dwellings completed, which naturally reflects the previous graph. The number of dwellings is put in relation to the population and the graphs present number of dwellings per every 1,000 inhabitant in Oslo.

The demand for housing is in this study, in theory, represented as changes in income, interest rate, population and employment. When the demand increases it should have an up-ward effect on the price of housing. As a result supply is supposed to adapt, which in turn should stabilize price. By looking at graph 1.7, number of dwellings started, supply's responsiveness to changes in demand can be observed. The only price decrease in housing during the time studied is seen in 2008. Looking at graph 1.7 the number of construction starts that follow in 2009 have highly decreased as a result of the lowered demand that the price represents. As a consequence of the lowered number of housing starts in 2009 less buildings were completed in the years that follow, as seen in graph 8.1. Since the demand for housing after 2008 recovered, maybe sooner than expected, the low level of completed housing has very likely affected price of housing since prices caused by an increase in demand will rise even further if there is a shortage in supply. Because of the lead-time in increasing the supply of housing there will always be a shortage in supply when the demand suddenly increases with a short-term effect on the price. As the supply numbers are put in relation to population the increasing population seen in graph 1.4 makes the fall in supply seen in the both graphs grater then if the population would have remained stable. Perhaps the population growth was not anticipated and therefore was a contributing factor to the shortage in supply. There are however many other possible reasons for the shortage in housing supply and far too many to start speculating.

In graph 1.8 the completed number of dwellings in 2012 have increased but as seen in graph 1.7 the increased level of housing starts in 2012 compared to 2011 have barely increased. The responsiveness to a decrease in price seems higher than the responsiveness to an increase in price. This rather inelastic supply indicates a possible explanation to the step price increase seen in housing, especially since 2009 when supply in relation to the years before was reduced.



Graph 1.8 Supply of housing (starts). Source; SBB (2013). Building Statistics. Table 06952



Graph 1.9 Supply of housing (completed). Source; SBB (2013). Building Statistics. Table 06952

4.1.4 Aggregated impact of market variables

From the presentation and interpretation of the market variables above it is clear that one should not judge the market by just observing the price increase. There are obviously many factors that can affect the price of housing. Looking at the aggregated impact of the market variables it can be concluded that the different variables do not only affect price but also each other. The employment level is high which increases the income level or vice versa More people can afford housing and more people can also afford better housing causing prices to rise. The high employment level and wages attracts people to the city's housing market and the population increases, which also cause prices to increase further. The increasing wages and demand pressure can also increase the cost of housing construction. Hence, the market variables are likely to change simultaneously and that will naturally cause prices to increase over a period of time. Further, the lead-time of increasing supply and the inelastic housing supply seen in Oslo makes it hard for supply to adapt to the increase in demand. This consequently causes prices to rise even more aggressively. Usually the Central Bank is able to ease the pressure on the market somewhat by raising the interest

rate but because of the recession in the global economy Norway's Central Bank is forced to keep the interest rate on a lower level than perhaps preferred. These changes in market variables have caused the estimated end value, the fundamental value of housing to change. Nevertheless as mention in the introduction chapter, changes in market variables can initiate a price increase in housing that is later sustained by an underlying bubble. This is why it is important to study the bubble indicators and foremost the behavior of the housing buyers, which will has been done in the following two parts.

4.2 Part II. Bubble indicators

The second part of the empirical findings will cover the result of the chosen indicators that have been tested on Oslo's housing market and an interpretation of those results.

4.2.1 Indicator ratios

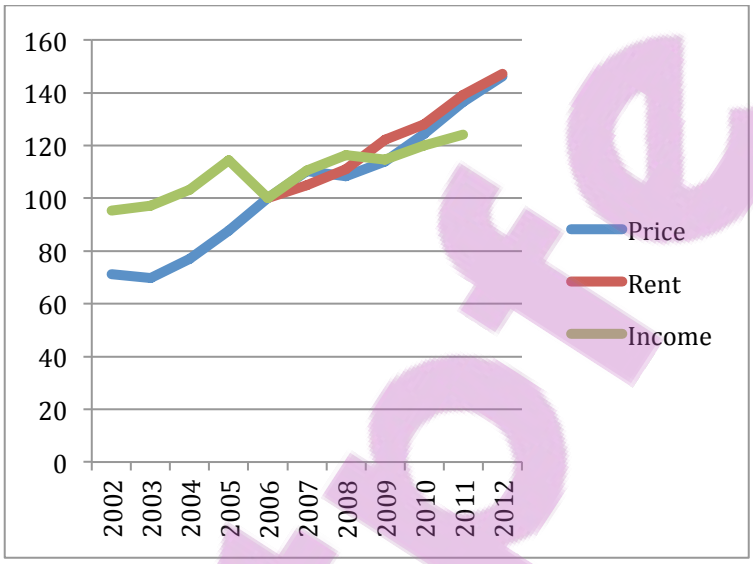
The tested bubble indicators representing ratios are, price-to-income- and price-to-rent ratio. Firstly in graph 2.1 however, is an index showing the change in average housing price per square meter together with the change in in average annual income and average annual rent per square meter. Thus, graph 2.1 illustrates price versus income and rent in three separate lines. Rent is only documented since 2006 and therefore 2006 will serve as base year. The two later graphs, graph 2.2 and graph 2.3 presents the price-to-income and price-to-rent ratios respectively.

Seen in graph 2.1, the index graph, price development is much steeper than the income development. It was also concluded in the previous part where the income development was studied that price had changed more than income. Looking at the graph here where the slope of price is significantly steeper it becomes more vivid that income alone did not affect price. The rent on the other hand follows the development of the price more closely as the two lines increase at an even pace.

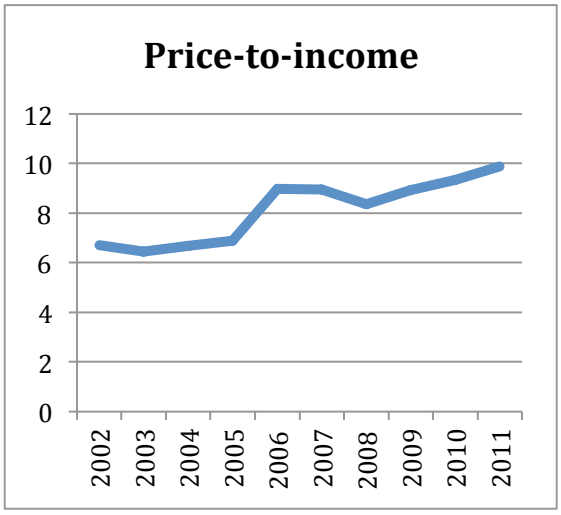
The price-to-income ratio seen in graph 2.2 is based on the average price of a 100 square meter dwelling in relation to annual income. In the beginning of the decade the average price was between six and seven times the average annual income in Oslo. In 2011 the price had increased to just below ten times annual income, which does not indicate a stable relation between income and price. Further, the graph shows that income and price used to correlate between 2006 and 2009 but as price increased at a faster rate than income the ratio indicates an unbalance between price and income. There is also no evidence seen in the graph that indicates a fall or a stabilization of the ratio on a somewhat higher level. The deviation from previous levels reveal how price and income increase at uneven speed. This concludes what was also suggested in the interpretation of the change in income variable; that increase in price must be caused by other factors than just an increase in the average income.

Graph 2.3 illustrates the price-to-rent ratio and is grounded on the average price per square meter in relation to the annual rent per square meter. The graph shows a bit of fluctuation as the price in 2007 was almost 23 times annual rent while it later fell to level of price closer to 20 times annual rent. An explanation to fluctuations in price-to-rent ratio can be found in the change in interest rate level. When interest rate is lowered it decreases the cost of owning a dwelling, making housing more affordable, which can cause an increase in price

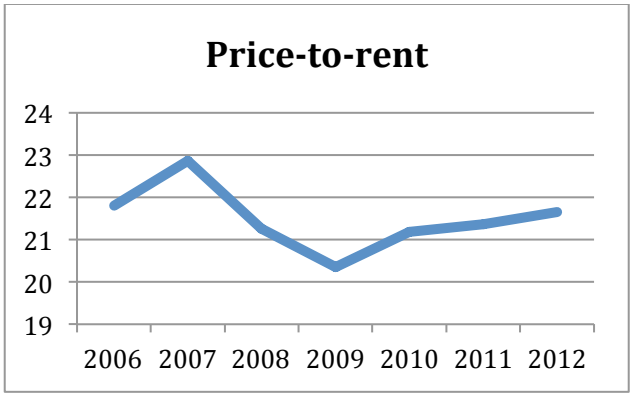
of housing, without having any influence on rent. Looking at the changes in interest rate between 2006 and 2011 above, it mirrors the change in price-to-rent ratio rather well. The fluctuations can also be derived from the time it takes for rent to adapt to changes in price. An increase or decrease in price is not followed by an immediate increase or decrease in rent, which is probably the reason why the ratio is lowered further in 2008 when housing prices fell. While most of the fluctuations seen in the graph can be explained with the change in interest rate level and the graph mostly seem to adjust back to previous levels the price-to-rent ratio is assumed more or less stable. A correlation between price and rent was also indicated in the index graph, 2.1. The index graph and the price-to-rent ratio illustrate how rent follows the price of housing, which indicates that the increased demand for housing is not only concerning owned housing but also rented housing. If the price increase of housing was caused by any irrational expectation regarding future gains derived from further price increases, rent is not supposed to increase at the same rate as price. It should be stated for the sake of the whole interpretation of the price-to-rent ratio; due to shortage in data it is hard to see an overall trend in price-to-rent ratio for Oslo and the information might be too limited to give a final determination.



Graph 2.1 The price, rent and income index. Source: SSB (2013). Rental market survey. Table 06952 (see graph 4.1 and graph 1.2 for further reference).



Graph 2.2 Price-to-income. Source: SSB (see graph 2.1 for number references)



Graph 2.3 Price-to-rent. Source: SSB, (2013). (See graph 2.1 for number references)

4.2.2 Number and age of homeowners compared to tenants

By comparing how the relationship between tenants and housing owners in the market has changed, information about Oslo's housing market can be obtained. Table 2.1 presents the number of people who lived in owned housing in Oslo 2001 compared with the number in 2011. The table is divided in age groups enabling observation of trends associated with age. Table 2.2 presents the same, except that instead of homeowners, table 2.2 presents number of people that lived in rented dwellings. With the information in the tables it can be clarified if there has been a trend towards owning instead of renting and if the younger generation enters the housing market earlier today.

Comparing the two tables it can be seen that the percentage increase of people living in owned housing in 2011 is slightly higher than the increase of people who live in rented housing. 18 percent compared to over 15 percent, which is a rather small difference. Calculating the share of home owners and tenants in Oslo's housing market in 2001 to compare with the shares of 2011 you find that the share of 74 percent in owned housing and 26 percent in rented housing has not changed. This indicates a stable distribution of tenants and homeowners in Oslo's housing market. A trend towards a bigger or smaller share of housing owners that could have affected the price of housing does not exist.

Table 2.1 Age and number in owned housing

Owns home	2001	2011	Increase/decrease	Percentage Change
20-29 years	50579	57625	7046	13.93%
30-39 years	68098	83537	15439	22.67%
40-49 years	54897	66776	11879	21,64%
50-66 years	71067	90364	19297	27.15%
67-79 years	34749	34349	-400	-1.15%
80 years or older	16601	16770	169	1.02%
Total number in owned housing:	295991	349421	53430	18.05%

Source: SSB (2013). Population and housing cencus, dwellings. Table 09812

Table 2.2 Age and number in rented dwelling

Rents dwelling	2001	2011	Increase/decrease	Percentage Change
20-29 years	34627	49633	15006	43.34%
30-39 years	28902	30923	2021	6.99%
40-49 years	14423	17252	2829	19.61%
50-66 years	14229	14369	140	0.98%
67-79 years	6225	4304	-1921	-30.86%
80 years or older	5156	3243	-1913	-37.10%
Total number of tenants	103562	119724	16162	15.61%

Source: SSB (2013). Population and housing cencus, dwellings. Table 09812

In the two tables, 2.1 and 2.2 it can be observed that only about 14 percent more of people in the age 20-29 live in owned housing in 2011 compared to 2001. In the same age group there are 43 percent more people who live in rented housing in 2011 compared to 2001. Perhaps as prices in Oslo's housing market have increased dramatically the last decade, young people struggles to enter the housing market. Hence, entering housing ownership in your 20' has not become more common. However in the age of 30-39 the level of home owners have increased significantly, over 22 percent increase compared to the close to seven percent increase of tenants in the same age between 2001 and 2011. This could

indicate a strong desire to enter the housing market, which is prevented among most of younger generation because of their inability to be granted a loan.

4.2.3 Loan-to-value ratio and interest payments in relation to income

The loan-to-value ratio gives information about how big share of the property value that needs to be self-financed by the buyer in order to be granted a loan. It is Finanstilsynet, a financial supervisory and independent authority (Finanstilsynet, 2009), in Norway who gives recommendations on what loan-to-value ratio the banks should apply to loans on properties (L. Gullhaugen at SEB Norway, personal communication, 2013-05-10). Finanstilsynet (2011) showed that the proportion of high loan-to-value ratio was on the rise and therefore considered whether an improvement in the credit assessment was needed. To tighten the guidelines for cautious lending practices in respect of residential mortgages, Finanstilsynet now recommends banks to apply a lower level of loan to value ratio. The new level of loan-to-value ratio was decreased from 90 to 85 percent of the property's market value, (Finanstilsynet, 2011). This means that the house buyers need at least 15 percent of the property value in equity. The action taken by Finanstilsynet in Norway is in accordance with the theory that would indicate a more sound credit market, which states that loan-to-value ratio should be decreased during a time of increasing property prices. This in connection with the fact that state authority is taking action the new loan-to-value ratio indicates a healthy credit market. Further, Finanstilsynet (2012) reports that Norwegian banks have a lot of financial strength, are profitable and have a low level of default on loans. The banks' reserve ratios are higher than the requirements and global standards. However they also report that the demand for loans in Norway is kept high caused by expectations about a low interest rate and continued growth in income. Debt has worryingly increased the most among the young people and low-income groups. It seems rather like the buyers are demanding more lending possibilities than banks encouraging people to make risky investments in the housing market of Oslo.

The final indicator studied is interest payment in relation to income. Whether debt has become an increasing burden for households can be observed through a look at interest payments in relation to income, which is presented in table 2.3. If the interest payments in relation to income have increased significantly this would indicate an unstable development of households' barrowing habits and a more unstable housing market. Interest payments are dependent on the interest rates and in 2006, which is the first year presented in the table, interest on loans were 4.7 percent and this is similar to the level of 4.6 percent in 2010. Comparing the level of interest in relation to income paid in 2006 with the level of 2010 it can be seen that a bigger share the households income goes to pay interest in 2010 than in 2006 indicating a trend towards higher leveraged households in Oslo like Finanstilsynet (2012) reported. However the level of increasing interest is not significantly higher (yet) and therefore it is an over-statement to say that the increased level of interest in relation to interest indicates unstable lending that could be associated with a bubble in in Oslo housing market. Yet again the short time frame in data presented prevents a clear interpretation of the interest in relation to income indicator.

Table 2.3 Household's interest payments in relation to income

Households in Oslo	2006	2007	2008	2009	2010	2011
Interest paid 0-5 per cent of total income	43.7%	38.8%	34.7%	40.5%	42.7%	41.6%
Interest paid 5-10 per cent of total income	21.6%	18.1%	14.6%	20.6%	21.9%	21.7%
Interest paid 10-15 per cent of total income	10.8%	13.3%	12.2%	12.7%	11.4%	12.3%
Interest paid 15-20 per cent of total income	3.9%	7.3%	9.4%	5.5%	4.2%	4.6%
Interest paid 20-30 per cent of total income	2.3%	4.9%	8.6%	3.4%	2.6%	2.7%
Interest paid 30-40 per cent of total income	0.7%	1.3%	2.6%	1.0%	0.7%	0.7%
Interest paid 40 per cent and over of total income	1.0%	1.6%	2.6%	1.4%	1.1%	1.1%

Source: SSB (2013) Household's income and wealth. Table 08727.

The selection of indicators were limited and much of the indicators involving irrational expectations will be covered in the next part about the buyers behavior in the housing market, giving further knowledge about the state of Oslo's market.

4.3 Part III. The housing buyers' behavior

The empirical findings' third part will present the result from the interviews with the real estate agents. The result gained is interpreted in the light of the theory of behavioral finance in housing markets, earlier given.

4.3.1 The result and interpretation of the interviews

The information obtained from interviewing the real estate agents will be discussed under four different headings. The first heading, covering question one to four, is about the agents' personal opinion regarding the housing market. Their view of the market will not be preserved as facts or even 'expert' opinions about Oslo's housing market since that was not the purpose of asking for their view. Rather their answers will enhance the general market expectation that prevails Oslo's housing market. The second heading about the buyers' expectations and demand covers question five to seven as well as question eleven about the buyers' sense of urgency to invest in housing. The third header, 'housing as an investment and the perceived risk of house purchase', covers the answers from question eight to nine, while question twelve is discussed under the header 'housing market excitement'. For reference all the answers from the interviews are summarized in tables found in appendix 2-4. It should be remembered that the facts presented about the buyers' beliefs are the perception of the real estate agents. The interpretation of the interviews is ended with a summary of what the interviews have revealed in connection to the given theory.

4.3.2 The opinion of the real estate agents

The nine interviewed estate agents have in average been working around eight years in Oslo's housing market and should therefore be able to determine changes that have occurred over the last five years.

Most of the real estate agents find the housing market of Oslo very stable. They admit that prices are very high today compared to historical levels but given the market conditions they find prices reasonable. Only one of the interviewed agents disagrees and blames the shortage in supply for the unreasonable prices. A number of agents bring up the fact that prices in central and high-end areas have increased much more than suburban areas outside of Oslo and the agents think prices in those areas are more reasonable. The different price range seen in the different areas confirms that there is a lack of substitutes in the housing market that prevents efficient prices in the housing market. One of the agents brings up that there is a lack of sufficient means of transportation that would make it easier to commute between Oslo and those suburban areas and that would be a contributing factor to why people still chooses to stay inside the city. This keeps demand for housing in central areas high but according to theory regarding population growth the development of communication systems is supposed to be expanded if there are problems to increase the supply of housing inside the city in order to attract buyers to the suburbs.

Within the next year or two, most agents believe housing prices will keep increasing or stabilize (with an even division between those two alternatives). Merely two agents suggested that price might fall to correct for the sharp increase in price, but in such case only a slight fall would occur, they believe. This could imply an irrational believe among the agents that prices that have increased for a long time will keep increasing or stabilize on what is a very high level. The question of when prices would start falling did not give much response, as most agents did not think prices would fall yet. The question was asked anyway to test whether the agents believed themselves as being able to predict falls in the housing market. The response have led to the conclusion that the agents do not believe do know when prices will fall, which contradicts the theory on behavioral finance, suggesting that people believe market events to be more predictable than they really are. Some of the agents clearly stated that it is impossible to say when prices will fall and one of these agents also reasoned that the market moves up and down constantly and you do not know when but eventually prices will fall. This view indicates a very healthy observation of a housing market. A number of agents tried to answer the question by instead proposing market events that could trigger a fall in price, such as interest rate increase or falling oil prices. When one agent mentioned the interest level increase as a possible factor to cause a price drop, he immediately added that such an increase in interest would never happen. This kind of expectation that the interest rate level will be kept on a low level in the future resembles the same kind of irrational expectation that the price will keep increasing in the future.

4.3.3 The housing buyers' expectations and demand

According to the agents answers the general view among housing buyers in Oslo is that prices will keep increasing in the next years to come. All agents answer that the buyers expect prices to keep increasing while two agents add that there are also buyers that think prices will stabilize. One agent adds that some buyers at least hope prices will stabilize and another states that even if most buyers believe prices will keep increasing there are some buyers that are aware that prices cannot continue to increase forever. However, not a single

agent answers that buyers think prices will decrease soon. This does not mean that there are no buyer in Oslo's housing market that think prices will decrease but the strong agreement on the buyers' price expectations could be associated with irrational market expectations among the housing buyers. As the majority of buyers seem to have this perception of prices the deviation from rationality is also highly systematic and could have effect on price. The rational sense of decreasing housing prices, due to the long period of increasing prices does not appear to exist among the housing buyers. This is confirmed in a working paper made by Norges Bank; "The percentage of Norwegian households who believe that property prices will keep rising has gone up from a low of 10 percent in 2008 to nearly 70 percent in 2012."(Norges Bank, 2013, p. 9). The year of 2008 is not an optimal reference point as many of the agents confirm that the housing market in Oslo was volatile at that time, as a consequence of the financial crisis. Still, the increase in high price expectation is extreme and proves how people base future price expectations on the price increase already seen in the market. Further, one agent describes how, especially the younger generation have trouble perceiving that prices can fall as they only have seen a house market with rising prices.

The theory Shiller (2000 and 2007) refers to as 'new era stories', stories that justify price booms in markets, can also be seen in Oslo's housing market. The price increase in the housing market, which most buyers think is stable, is often explained, simply by the growth in the rest of the economy. One agent states; "Oslo is growing extensively and the future looks bright, no wonder buyers expect prices to keep increasing." Both real estate agents and the house buyers have their explanations on why housing prices in Oslo have increased, which they happily share with others. What they all have in common is that they justify the price increase seen in the housing market of Oslo. It is mentioned by two agents that buyers they meet in the market expect the price of any piece of housing to be sold above asking price even before the bidding. That kind of expectation naturally affect price, one of those agents states. That is confirmed by the theory, which states that high price expectations are often self-fulfilling

According to one agent, people of the older generation are often concerned about younger generation that is about to enter the housing market. The older generation finds it important to buy and own your own housing, preferably as soon as possible. They encourage the younger generation to enter the housing market because they themselves have experienced the rapid price increase and are eager to share their positive experience. Somehow the situation is similar to what Shiller (2007) saw in the US house market, when people were encouraged to buy their own house. However, in Norway owning has always been perceived as better than renting, the agents explains. "Norway is probably the housing market with the highest number of housing owners, in relation to population size, in the world", an agent clearly states. The indicators also revealed that about three quarters of Oslo's population lives in owned housing, a level that has not changed in the last ten years. Three quarters of the population in owned housing truly seem like a very high level. It is indicated by many of the other agents as well that buyers think owning is much better than renting and some buyers therefore feel a sense of urgency to enter the market as soon as possible. Not too many buyers feel urgent to enter the market because they are anxious prices will increase too much, more because they desire to own instead of renting and wants to enter the market early.

According to the real estate agents perceived view of market demand the pressure on market has not increased substantially. The questions of whether there are more or less people at the showing of an object, and whether the number of biddings has gone up,

received very mixed answers, even if a majority of the agents answered that both numbers have increased. The answers can be seen as more or less random and depend more on the location area as many of the agents suggested. One agent refers to the buyers as highly price sensitive. If a piece of housing is advertised slightly lower than the average price of housing in the market, the numbers of potential buyers that show up immediately increase. This could be associated with the theory suggesting that investors base the price on what is has already been expressed in the market and that would be the reason why they immediately react to the price that is lower than the average market price of housing in Oslo. Further, the agent answers that it is more common today with prices that end up above asking price (taxation price), which they add differs a lot depending on the area. One agent believes that the reason for prices to more often end up above asking price today is because people expect prices to do so, as a consequence of the view media has presented about housing prices. Again, this confirms how the investors base price on the price already given in the market. It also confirms the notion of media as the distributer of common beliefs, spread in the society.

4.3.4 Housing as investment and the perceived risk of house purchase

A vast amount of the real estate agents reveal that there are many people who invest in Oslo's housing market for pure investment reasons. Some of the agents feel that the number of investors have increased, while one agent clearly states that between 2000 and 2007 there were a lot more speculation in the market. He continue to explain that today people who invest in the housing market make long time investments by buying and renting out the property rather than buying and selling short term to make profit. This is confirmed by several of the agents who state that investors have been present in the market for a rather long time but it has become more common to buy and make money by renting out a second or third piece of housing. It is explained by one agent that it has become harder to buy a piece of housing and sell it with profit because the prices today are already on a very high level, which makes it harder to increase the value. There is however agents who present a different view, claiming that there are investors in Oslo's housing market that makes hundreds of thousands, up to one million Norwegian Kroners on rather short term housing investments.

Question nine, "Do you see any changes in how long buyers are planning to own the housing before they will sell it again?" wanted to reveal the change in short time investment in housing as a consequence of speculation in the housing market. That question however, did not gain much result. Most of the agents interpreted the question to how often or many times the average buyer change housing. From those answers it can be concluded that there is an on-going trend towards moving more often. One agent states the previous average housing buyer used to change housing three times during a lifetime, today that average housing buyer change housing five times during a lifetime. However the answers did not indicate an increasing level of buyers that buy and sell quickly to make money but it did not provide an answer that contradicts the occurrence either.

The agents answer that there are both professional investors in the housing market as well as private. The private investors are usually those who buy for the purpose of renting out the housing. One agent explains how this is a smart way to secure your pension funding as housing investment is perceived as a very safe investment. Housing purchase has never been perceived as risky in Oslo or Norway for that matter, something all agents agree on.

Many agents describe this low-risk perception as reinforced today. One agent explains that the buyers expect higher future gains today, especially in the long run. As long as the buyers receive credit at the bank they are more than willing to enter the housing market. The buyers, as well as the agents do not think it is possible to lose money in the housing market and to rent housing is seen as second alternative. Most people therefore seem to think that buying a piece of housing is the only alternative and the sooner you enter the housing market the better. One agent describes the Norwegian house buyers as highly risk averse. He states that nowhere, especially in Europe are so many housing buyers choosing floating interest rates instead of a fixed interest rate on their debt. This can be associated with irrationality and according to Lind choosing riskier financing alternatives when the market is doing well, could indicate a bubble. The reason so many buyers are choosing a floating interest naturally has its background in the buyers expectation that interest rate will remain low. This irrational expectation about the future market is a defining characteristic of a bubble and also implies sensitiveness to future increased interest rates.

4.3.5 Housing market excitement

The agents describe the interest for the housing market in Oslo as very big, but not all agents agree that the interest have become more intense than before. One agent says that along with the financial crisis in 2008 and the collapse of US housing market the housing market and issues related to the housing market also in Norway and Oslo received much more attention. Others think the interest as well as the knowledge about the house market has increased. One agent claims: "Just open up any newspaper or magazine, today they have whole sections devoted to the housing market." A great share of the agents believes that the attention of the housing market in media has contributed to the interest seen in society. However, as some agents clarifies, the great interest in housing is rather justifiable, given the great share of people who own, or are planning to buy, their own housing. Still it is the author's belief that the prevailed attentiveness of housing among people, consciously or subconsciously has attracted more buyers to enter or considering entering the housing market. Since many people own their housing there is a possibility that people who have not yet entered the housing market get influenced by the other people in their surrounding who have entered the housing market and realized their dream. The word-of-moth talk by the people who own housing or are planning to become a house owner can also have influential power on people outside the housing market.

The buyers biggest concern regarding the housing market today, according two agents, is the price development. The buyers are always looking for the best time to buy or sell their housing one agent explains. The buyers are also said to closely observe the interest rate development but the increased concern also involves interest for things that involves house ownership, such as interior design, which can add to a housing's utility value. The housing market does not seem to be influenced extensively by 'fortune' stories, stories of how people have made a fortune on the housing market. The reason, one agent explain is that people sell and buy on the same market and therefore it is hard to make money when you sell a piece of housing if you have to buy a new one in the same market. However, when agents were directly asked if these kinds of stories could be associated with Oslo's housing market many admitted that these kinds of stories exist in the market to some extent. Usually, however the increased value of housing brings other benefits to the owner, such as more beneficial interest rates and increased wealth to be used as security for credit, which people naturally discuss.

4.3.6 Summarizing the interview results

A recap of the theory on behavioral finance presented in chapter two will be made in order to distinguish what has influenced Oslo's housing market and see if there are any behaviors that possibly could have affected price and a the formation of a price bubble.

The section regarding word-of-mouth and inefficient markets concludes that irrational investors have influential power on prices in financial markets while their irrational behavior often is not random but rather systematic. The reason for this is that similar ideas are communicated and spread through the media and word of mouth. The irrational price expectation that price will continue to increase seem to be a very common belief among the buyers in Oslo's housing market and media has induced the buyers highly with ideas about the housing market. It also is clear through the interviews that there are many stories in circulation on the market that justify the price increase and this have most likely had effect on the expectation of increasing prices. The theory regarding systematic irrational price expectations explain how investors often base expectations on past historical data and thereof the housing buyers in Oslo probably based much of their expectations on the price increase already seen in the market. This kind of expectation on price should also increase investors' willingness to bear risk, which according to the interview answers have not increased significantly but only because the willingness already is on a very high level.

Over-confidence from the theory refers to a tendency in humans to put more confidence in one's own belief than what is rational. This was tested by observing whether the real estate agents, who are likely to be very confident about questions regarding their area of profession, perceive themselves as being able to tell when prices in the market will fall. This gave very little response and concludes that over-confidence is not present on Oslo's housing market at least not among the real estate agents. Something that is on the other hand present on Oslo's housing market is that prices are sticky downwards. While the belief that prices only increases and never fall is deeply implemented in peoples mind prices have shown to be slow in changing direction. The final subject that is brought forward in the theory is herd behavior. While little evidence that confirms herd behavior on Oslo's housing market was found, the behavior among the great share of people in the market who choses owned housing before rented housing seen in table 2.1 and 2.2 could symbolize some kind of herd behavior.

Under the theory concerning indicators buyers' excitement for the housing market, speculation and urgency among buyers were discussed briefly as indicators of a bubble. Some of the interview questions covered those areas and it was clear that there is a great excitement influencing Oslo's housing market, both in the media and as discussion topics among people. An explanation is however that there is a big share of house owners in the market and housing is often part of a person's greatest wealth. Hence, it is natural that people put a lot of interest in the housing market. Further, sense of urgency among the buyers also occurs in the housing market of Oslo. People are eager to enter the housing market but not necessarily because they are afraid prices will rise too much. Additionally, Oslo's housing market has its share of investors who contribute to a greater demand for housing. However, there is very little indication of speculation and short time investments seen in Oslo's housing market, which are those kinds of behaviors that makes the market most unstable according to theory. Conclusively, the interviews have shown indication of irrational expectations in the housing market of Oslo. However, they have shown less

accordance with irrational behavior, such as speculation and entering the market for urgent reasons.

5 Conclusion

The conclusion begins with answering the three research questions separately, followed by a final conclusion to fulfill the purpose. This chapter also contains some reflections on the study made as well as suggestion for further research.

5.1 Answering research question one

'What has likely been the impact of the changes in common market variables that are known to affect price of housing, on Oslo's housing price, between 2002 and 2012?'

Given the changes in market variables presented in the fourth chapter, the impression is that the changes seen in the market have contributed to a rather steep increase of housing prices in Oslo. The low supply of housing made an increase in price unavoidable and has been a contributing factor to why prices have increased more than the increase in income. Yet, it is difficult to say to what extent the changes in market variables have affected prices in the housing market. It is possible that price have been very sensitive to the changes in income, population growth and increased construction cost, which were the factors that visually seemed to have the highest correlation to the price increase of housing. Supply of housing was relatively low given the high price of housing, which enhanced the effect of the changes in market variables even further. There is also a phenomena noted in housing markets were an increase in the demand affects prices to rise while a fall in demand reversely does not affect prices to immediately fall. This seems to have affected Oslo's housing market, which might have prevented prices from falling back to past levels when supply is getting more stable.

5.2 Answering research question two

'Further, what kind of indication does a chosen set of house bubble indicators give about the state of Oslo's housing market?'

The tested indicators do not reveal a highly unstable housing market or give any distinctive warning signals that indicate a bubble in Oslo's housing market. The price-to-income ratio enhance the impression that price must have been caused by other factors than only income increases but the price-to-rent ratio indicates that the increase in housing price is not caused by irrational price expectations.

The demand for owned housing in relation to rented housing has not changed in the last ten years since the level of homeowners in relation to tenants in Oslo's housing market was high already ten years ago. Entering ownership in the age of 20-30 has not increased but in the age between 30-40 it has. The change in the age distribution among house owners and tenants indicates a desire among the younger population in Oslo to own housing today. This could mean that there might be a demand for easy lending possibilities. If that would occur, the market would increase the risk of an unstable outcome. Luckily the credit market gives indication of being responsible, preventing such risks. An example is the loan-to-value ratio that has decreased in Norway during this period of highly increasing housing prices.

It is only the increased interest payments in relation to income that are slightly alarming among the indicators. Loans are reported to have increased most among young people and among people in the low-income groups, which could indicate a slightly unstable development on Oslo's housing market. The shortage in data prevents any statement of how severe the change in interest payments and increased debt really is.

5.3 Answering research question three

'Finally, would an examination of the behavior and beliefs of Oslo's housing buyers indicate any irrational market expectations, that could have affected price and contributed to a bubble formation?'

The observation of housing buyers in Oslo, made by real estate agents, reveals a great share of irrational market expectations and thoughts among the housing buyers. Most defining is the majority of buyers (and the real estate agents) with expectation that prices will keep increasing as well as expectation that interest rate will remain low. The expectations that price is very unlikely to fall indicates irrational beliefs among the buyers who most likely base their expectations on the price increase already seen in the market. Further the buyers justify the price increase through simple stories regarding high income and bright future prospects. These kind of irrational beliefs and expectations are believed to have had some effect on price of housing but they are not seen as strong enough to have caused a bubble. Hence, irrational thoughts exist among the housing buyers in Oslo but these are not believed to have caused irrational behavior among the buyers. If the buyer's do not act on their irrational beliefs the risk of a bubble remains low. Yet, buyers base price on what is already expressed in the market and expect housing prices to always end up above asking price, which becomes self-fulfilling and is connected to the downward stickiness of housing prices that has also been observed on Oslo's housing market. This tendencies is believed to have caused prices to become rather unreasonable and slightly above its fundamental value without necessarily contributing to a bubble formation.

Notable in the study of Oslo's housing buyers are however the high concern about the housing market in general. The majority of people seem to have an interest in housing. It involves so many people and affects so many people's lives. The interest for the housing market has according to the agents only increased slightly, but perhaps from a long-time perspective people value housing more today than they have done previously. The increased interest does not only involve the price of housing, rather being a house owner has become a life-style that adds value to the everyday life. Part of the price increase could symbolize that of kind of value, which does not indicate a bubble but an increased value of housings' fundamental value.

5.4 Final conclusion

'What have caused the price of housing in Oslo to increase between 2002 and 2012 after the price had already been rising sharply for over a decade? Can the price increase be derived from changes in macroeconomic variables or does a bubble exists in Oslo's housing market?'

The market variables reveal that changes in economic conditions on Oslo's housing market have affected price to increase sharply. Also the observation of the housing buyers informs that their expectations on housing prices have affected the housing market. The result from the interviews confirms that the buyers are affected by irrational thoughts and expectations

but the result from the bubble indicators and the market variables show little indication of a price bubble being the cause of the price increase seen in the housing market. The changes in market variables support the price increase and the indicators reveal little evidence of a bubble in the housing market of Oslo. With this stated, changes in macroeconomic variables are predicted as the cause of the price increase seen in Oslo's housing market. Nevertheless, human expectation and irrationality is still assumed to have had effect on price but no housing market is believed to exists without being influenced somewhat by human behavior. Yet a bubble on Oslo's housing market is not predicted to exist, as of now.

5.5 Reflections

This study was performed by looking at three different aspects of Oslo's housing market to give a broad view of the market and a greater understanding for the market forces. It was rewarding to study three dimensions of Oslo's housing market, which increased the understanding not only for Oslo's housing market but also for the complexity of housing markets in general, which was part of this thesis purpose. However, studying three different views of a housing market restricted the study in matter of preventing the research of going into detail in the different areas.

This study is one of many in its field and it is questioned in previous researches if it is even possible to make a prediction of weather a bubble exists and therefore trying to justify the prediction power of this kind of research dominated the study at its infancy. The notion of impossibility prevailed, which have influenced the study's intelligibility. Further it was noted when performing the study that a longer timeframe would have made it easier to observe changes and relationships in the market.

5.6 Suggested further research

This research has touched upon many interesting fields of study and as mentioned in the reflections above, the three areas of research could have been studied in greater detail and therefore this study serves as a perfect background study for further research in the fields of market variables, house bubble indicators and human behaviors impact on housing markets. The impact of human behavior on different markets could be studied to a greater extent and detail through a survey research. The reliability of the bubble indicators could be tested further to improve the usage of such indicators. Most of the market variables' effect on housing price could be studied exclusively and on several different housing markets to increase the knowledge of the variables forces. The performed study has been visual comparison with few clear answers. A natural next step would be to use more statistical methods in a study of Oslo's housing market. In such study the assumptions that has been concluded in this study could be tested and serve as a good foundation for further research in the same field.

In the case of Oslo's housing market, the supply of housing should be studied closer. The relatively low supply is believed to be one of the most contributing factors to the price increase in Oslo's housing market. This study never revealed or made any suggestions to why the supply did not increase further while the price kept increasing, which would be an interesting problem to study.

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Appendix 1. **Survey Questions for the telephone interview with estate agents in Oslo**

Question 1-4, the agents' personal opinion

1. How long have you been working as a real estate agent?
2. What is your personal feeling about Oslo's housing market?
    - Is it stable?
    - Are the prices on Oslo's market reasonable?
3. How do you think the prices on the housing market will develop in the next coming year(s)? (Keep increasing, decreasing, or not change/stabilize)
4. If you think prices eventually falls sometime in the future, when do you think this will happen?

Question 5-12, concern the buyer or potential buyer (the people real estate agents meet at showings), in the question below referred to as the 'buyers'. The survey wants to reflect the buyer's general view of the housing market, housing prices and their behavior on the housing market. Important is how these things have changed in the last 5-10 years.

5. Do you believe the buyers of today have the same beliefs about the price as you or what are their beliefs?
   - Do they think the prices will increase, decrease or stabilize?
   - Do they think the prices are reasonable? -

6. Looking at the pressure on the market, do you think the number of people showing up at viewings have changed (to more people, less people or no change) if you look 5-10 ten years back?
   - Have numbers of biddings followed the same trend?

7. Is it more common today with prices being bided above taxation price (asking price)?

8. Do you find any change in the number of buyers, who buy their home for pure investment reasons? (More, less or no change)

9. Do you see any changes in how long buyers are planning to own the housing before they will to sell it again?
   - Are there more buyers today that buy their home, with a plan to make money?

10. Do you think buyers see house purchase as a risky investment?
    - Has that view changed?

11. Do you happen to meet buyers who feel urgent to enter the housing market, caused by beliefs about prices rising so much that it will eventually be too late/expensive to enter, or for other reasons?

12. What do you feel is the society's overall interest in housing and the purchase of housing?
    - Has the interest in housing changed?
    - Is housing a (more or less) common topic among people in general?
    - Is there some stories or topics that you think is brought up more often?
    - Do you get any fortune stories about people making a lot of money from housing investments?

Appendix 2-4. **The answers from the telephone interviews**

Questions	Q1: Working years?	Q2: Personal opinion about housing market?	Q3: Price development?	Q4: Falling prices, when?
Agent 1	12 years.	Stable market and price.	Keep increasing.	In the future maybe. Don't know when. Attractive housing keep increasing and unattractive might fall.
Agent 2	5 years.	Growing. High prices but natural explanations. Globalization of price – you cannot live in the middle of the city but not good enough communication to the suburbs	Keep increasing. Possible with future correction or stabilizing prices.	Impossible to say when prices will fall.
Agent 3	5 years.	Growing city, growing market. A shift in the market, no longer every man's right to live central. Cheaper in the suburbs	No change, maybe increase a little or even decrease.	When the government is taking action to correct prices.
Agent 4	7 years	Stable and prices are growing well but supply of new housing is not growing as well.	Keep increasing	Impossible to say when but because of external factors. Not a long decrease in price.
Agent 5	5 years	Stable market. Prices are high yes, but as long as people pay it is reasonable.	Stabilize but not decrease.	Never. Only if the interest rate increases, which it shouldn't
Agent 6	14 years	Stable market today but prices will always go up and down. Expensive yes but more area based and compared to wages not so expensive.	Stabilize.	Not possible to say when but just that it will eventually fall sometime.
Agent 7	10 years	Stable market. Prices are high but caused by market forces hence price is reasonable.	Stabilize	Hard to say. Economic event such as rent increase.
Agent 8	10 years	Good flow on the market. Hard to get in on the market because of price, especially in central parts of the city.	Stabilize or perhaps decrease.	In 2015
Agent 9	7 years	Stable market, expensive but always been. However big differences in price between different areas.	Keep increasing	Impossible to say but could happen in connection with falling oil prices.

Q5: Buyer's price expectations?	**Q6: Market pressure on showings?**	**Q7: Price above taxation price?**	**Q8: Housing, pure investment?**
Price keeps increasing because of positive future perspective, Norway is doing so well.	No change but feel there is more housing in circulation, hence more showings	No difference, some under very few over because of many objects in the market now.	More buy as investment.
Continue to increase or stabilize. But they think prices are high.	No change.	More above taxation price today. Depends a lot on the area.	It's been seen as an investment a long time but a lot of people buy to rent out or sell later with profit.
Keep increasing, stable market. Older generation is pushing the younger to enter market – they have experienced the price increase.	Less people on showings today but perhaps more interest in actually buying. Also less biddings	No change.	No change. Some people buy housing to make money by renting it out.
Prices will keep increasing – think market is stable.	Only sell new housing so cannot tell.	Only sell on fixed price	In 2000-2007 a lot of speculation buying. Today long term investment by renting out but yes, more speculators today.
Prices will keep increasing but also expensive. Many buyers ignorant, do not keep up with price development	Both number of people on showings and number of biddings has increased.	More common because people expect prices to go over from what they heard in the media.	Yes more people buy as investment. To buy and sell later with profit is however harder today, prices to high already Meet a lot of speculators at showings.
Prices will keep increasing. Young people have never seen the market decline and think prices will keep increasing forever.	Higher pressure now but lower than in 2006. Buyers are price sensitive and if prices are "low" more people come to the showing.	Above is more common but depends on the asking price.	More investors today and can make between several 100 000 up to a million
Prices will keep increasing and all housing is sold above taxation price. Some buyers waiting and hoping for stabilization.	Same amount on showings but more biddings	Many end up above taxation and it is more common today.	Professional investors have been on the market for some time but many are now buying to rent out.
Increasing prices and those prices will rise above taxation price on biddings. Therefore pay higher prices. Some buyers aware that prices will not increase forever.	Higher pressure on the market but not necessary more buyers, perhaps less objects.	More common with prices above. Depends on the area, in my area 78% are sold above taxation	Meet investors pretty often so more common today.
Prices will keep increasing. Expensive because of explosive rises. Buyers always think it is expensive because most dream of better housing	No real change. Comparing to 2008 level it is higher because it was unstable then.	No change	Less people buy to sell with profit but more buy to rent out.

Q9: Change in owning time?	Q10: Home purchase, risky investment?	Q11: Feel urgent to enter market – prices are rising too much?	Q12: Societies interest in housing market?
Owns shorter time and larger number of housing during one lifetime. Wants to make money from housing, More different ways to make money today.	Very safe investment, especially with the price increase that has been. Perceived as much better than renting.	Buy housing when in need but more impulsive than before.	It is very big in the media and people talk a lot. Of course people talk about how much their housing has increased
No change. Depends on area. Some are more common to stay shorter than other areas.	Never been seen as risky so as long as people get a loan they are positive to buying.	Want to enter market early and not rent. Higher level of homeowners in Norway than anywhere else.	Always big topic because of media, but buyers also has an increased knowledge of the housing market.
Not planned but people do change housing more often. Before 3 times during one lifetime, today 5	Always been safe investment. But since it is a lot of money people take the decision seriously.	Not because prices are rising but because desire to own instead of renting	Big interest because of news. Want to keep updated on price development, know when to buy/sell
Shorter owning time compared to older generation today.	See no risk. Wish to enter the market and are not afraid of market development. Buy and sell on the same market	No	Always been a big interest for people who are in the market or like to fallow its process.
Not really. Depends on size of object. Smaller then change sooner.	People don't perceive much risk but are more careful what they buy. In the long run people know prices will increase.	Yes, it happens. People with little saved equity wants to find something that match. More equity less afraid to wait.	Always popular topic but more so along with the financial crisis in 2008. The talking spread to Norway's housing market and people became more careful then.
People own shorter time but not necessarily to make money, it's a growing trend.	No risk and today people feel less risk on housing market.	These buyers exist and have increased in number	Always been of great interest. Focus today is price development and interest rates.
The circulation of housing is bigger today because younger people enter the market and want to change housing sooner.	To buy housing have never been seen as risky. Only if the lending conditions are. Even less risky today.	People feel it is important to enter the housing market and some perhaps feel a little stressed.	The interest is much bigger today. Look in any magazine; they have whole sections about housing.
No changes the ones that are trying to buy and sell with profits are professional investors and not private people.	Never been seen as risky to buy housing.	Some feel stressed to enter market while other wait and hope prices will fall	Big interest. Want to fallow the price movements. Common to talk about because most people own or will buy soon and in most cases it's the people's biggest wealth.
No change. People buy when in need.	Perceived as a very safe investment to buy housing	Those buyers exist but not a common motive for buying.	Always been of great interest because most people in Norway own their housing or will own and then t is natural to care.