The Norwegian housing market - financial stability on the edge?

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"One of the world's hottest housing markets is now cooling fast, sparking concern that a bubble is bursting after the rapid price increases over the past years."[1]

[1]Sleire, S., (2017, July 5). Norway´s Housing Market Downturn Gathers Pace Amid Bubble Fears. *Bloomberg*, Retrieved from https://www.bloomberg.com/news/articles/2017-07-05/norway-s-housing-market-downturn-gathers-pace-amid-bubble-fears. Accessed September 11th 2017

Preface

Before you lies the thesis "the Norwegian housing market - financial stability on the edge?", the basis of which is research into different economic and demographic factors that cause the fluctuations in house prices and household debt. Furthermore, whether Loan- to- value (LTV) ratio adjustments should be used as a stabilizer.

It has been written to fulfill the graduation requirements of the MSc Accounting, Strategy and Control at Copenhagen Business School. I began researching and writing this thesis from March to September 2017.

It should be noted that this project started out as a collaboration with Camilla Løfsgaard Lie, but ended as an individual thesis process. The reason for this was largely due to some issues arising from division of work and unclear communication, as well as some unforeseen circumstances. The process of writing alone was not one that was taken lightly, and the partnership tried hard to find a compromise that would also lead to a good product. The division of work was done in accordance with a contract we wrote, see Appendix 6. Writing a thesis alone has been a challenging, but also rewarding process, and it was the right decision to end the partnership.

I would like to thank my supervisor for the good advice and helpful guidance. A special thank you to all the people who have supported me throughout this thesis process.

Camilla Maltina Gravdal

Abstract

The Norwegian housing market has seen a soaring development throughout the past decades. Looking particularly into the current situation, it seems that the increasing house prices and household debt is a direct threat to the Norway's financial stability. Government interventions, such as Loan- to – value ratio (LTV), is used as a stabilizing tool to diminish abnormal fluctuations in an economy. The Norwegian market and regional economic differences will be used as a case study, and provide a framework that will be applicable for other advanced economies in seeing under which circumstances an implemented tighter control of a LTV ratio is valuable for financial stability. The LTV behavior will be analyzed to see what economic factors are best suited for this intervention. For the purpose of this thesis, Norway is divided into seven geographical regions, where each will be examined to see how such different regions in an economy behave. Furthermore, to analyze the reasoning behind the growth in housing prices and household debt, and to evaluate any such correlation to financial stability. In order to understand how these different regions behaves, a set of fundamental factors were conducted from previous empirical evidence and studies. Together with statistical evidence, multiple regression is used to identify the correlation. as well as each variables strength towards explaining the variation in the expansion in prices and debt. Moreover, to find the optimum combination towards an LTV effect. It seems that there is a sound reason to argue that an LTV implementation diminishes both housing prices and household debt. However, only under certain economic conditions and factors, where it can be used as a tool to adjust the price growth in any of the two dependent variables.

Table of Figures

List of Tables

1. The Norwegian housing market - financial stability on the edge?

1.1 Background

There have been long and uncertain discussions regarding the Norwegian housing market, and whether the country is experiencing a bubble in its housing prices. According to statistics it is evident that the housing prices in Norway have increased tremendously from the early 1990s and until today (Larsen, E. R., 2005). As income has not followed the same rapidly increasing trend, experts have forecasted a crash in the housing prices for several years (Grytten, O., 2009). There are many different opinions as to what actually constitutes a housing bubble, and what drives such price fluctuations. Some would argue that if the house prices deviate from the development of economic fundamental, then we have a bubble (Jacobsen, D. H., & Naug, B. E., 2005). Others will say that such factors are of less importance, and that the current housing market is largely influenced by increased wealth (Grytten, O., 2009). Additionally, there are many demographic factors that are likely to have had an effect on the pricing trend. The most balanced conclusion might be that the reasoning lies somewhere in between these opinions. What is clear is that the Norwegian housing market has seen a marked increase, which makes it an interesting case study.

An interesting factor, in relation to the demographic tendencies, is that household debt has increased at a higher speed than income. This places Norway at the top percentile of a highly unattractive club; with some of the highest debt levels in the world. According to Jácome, L. I. & Mitra, S (2015) rapid and continuous growth in housing prices, with corresponding increasing debt levels, is a sign of financial instability. This leads to questions regarding financial stability, and furthermore as to whether the government has implemented sufficient interventions to stabilize the economy and avoid a potential burst. One such intervention method a macro-prudential policy tool, called the Loan-to-Value ratio (LTV) which functions as a stabilizer in the lending market.

The global financial crisis in 2007- 2008 was followed by rapid growth in housing prices in many areas. As a result, the LTV ratio became increasingly popular, and numerous countries implemented its use with the aim to mitigate effects of shocks on the housing sector and sustain economic stability (Jácome, L. I. & Mitra, S., 2015).

1.2 Research Question

This thesis will focus on Norway as a case study, by using its demographic differences as a platform for comparison and to identify the economic factors that drives the fluctuations in both house prices and households' debt. Norway implemented the LTV guidelines for the first time in March 2010, and then tightened it in December 2011, with the aim of stabilizing the housing prices and debt levels (Tressel, T. & Zhang, Y. S., 2016). In June 2015, it was formalized as a regulation with a further tightening (Norges Bank, 2016). Additionally, new legislation was put in place on the 1.1.2017, which tightened the lending requirements even further, adding regional specific directions. This was the first regional specific tightening that has ever been done in Norway. It was implemented such that the capital Oslo, due to a vast and soaring price development, has tighter requirements compared to the rest of the country.

For this thesis, I will investigate what kind of impacts such regulations may have, based on historical results in Norway. Furthermore, I will look at the different adaption capabilities in the various regions.

The research question for this thesis will be:

«Do demographic factors affect the relationship between a house price expansion and household debt? Should Loan- to- value (LTV) ratio adjustments be used as a stabilizer? »

The corresponding hypothesis that I will look into will discuss:

1. An expansion in both house prices and households´ debt is a risk for financial stability.

2. The LTV ratio has a positive effect in stabilizing an expansion in house prices and household debt.

Due to major regional differences within the country, I consider it beneficial to analyze both the fundamental factors and the LTV effects in the different regions. The LTV cap has previously been nationwide, but the levels of fundamental factors and housing prices are different from region to region. Taking this into account, this thesis will aim at understanding what conditions are best suited in order to tighten the LTV ratio based on the specific fundamental factors in each region.

1.3 Thesis Outline

With regards to the outline of this thesis I have chosen to look at whether demographic factors affect the relationship between housing price expansion and household debt, furthermore, if LTV ratio adjustments may be used as a stabilizer. The thesis will use quarterly data from year 2005 until the fourth quarter of 2016. A regression analysis will be conducted, adding dummy variables in the period of implementation and tightening to see if it has any effect and whether there are differences across the country.

There will be an analysis of the adoption capabilities and effects to a change in LTV, as Norway changed their loan-to –value ratio cap after it was first implemented in 2010. According to statistics (Meyer, C., 2016) housing prices further increased after this period, if we look to a national level, but this thesis will investigate the differences between regions.

Norway is organized into nineteen different counties, but for the purpose of this thesis I chose to divide Norway into seven different regions, see the figure below.

1. Agder & Rogaland includes the counties of: Rogaland, Vest-Agder and Aust-Agder
2. Hedmark & Oppland
3. North: Nordland, Troms and Finnmark
4. Oslo & Akershus
5. South East: Østfold, Vestfold, Buskerud & Telemark
6. Trøndelag: Nord-Trøndelag and Sør-Trøndelag
7. West: Hordaland, Sogn og Fjordane and Møre og Romsdal

Fig. 1.1.

The figure below illustrates the development in the Norwegian housing market, clearly illustrating the soaring increase over the last few years. Interestingly, one can also detect the price plunge in Agder & Rogaland due to the decline in the oil-prices in 2014, which severely affected Norway's oil capital, Stavanger.

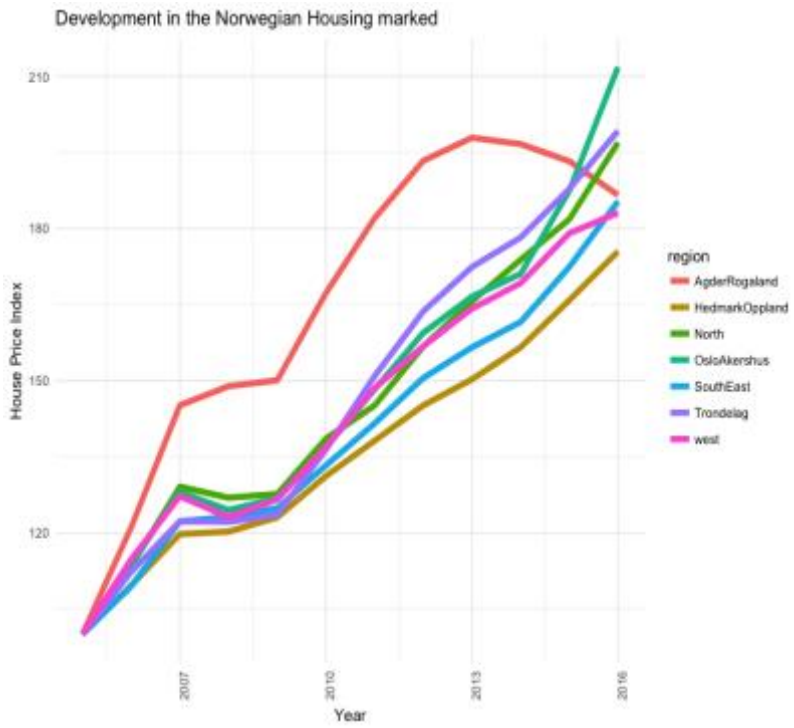


Fig. 1.2.

2. Literature Review

2.1 Housing Demand and Supply

To understand the underlying market factors in an economy, in particularly in the housing market, it is important to have an overview of what impact different factors may have on the price fluctuations. The housing market is driven by housing demand and housing supply. Basic supply and demand theory tells us that when demand exceeds supply prices will rise and vice versa (Dorman, P., 2014). For a market to be efficient it must be in balance, where demand and supply eventually will achieve equilibrium (Dorman, P., 2014).

By extending this to the housing market, we see a situation where the house prices are driven by the demand of housing and its corresponding supply. Housing demand is a function of income,

population, wealth and the user cost of housing (Gallin, J., 2006). The user cost of housing is explained by the price of housing, mortgage rates, income and capital gains. The supply side is a function of the price of housing and the cost of new constructions (Gallin, J., 2006).

As construction of dwellings take time, there will be a time lag of the effect on the supply side and it is therefore suggested by Jacobsen, D. E., & Naug, B. E, (2004) and Gallin, J., (2006) that a distinction between short and long term is important. Taking the time lag of construction into consideration, the house price only fluctuates around demand in the short term, where supply is held constant (Gallin, J., 2006), (Jacobsen, D. E., & Naug, B. E., 2004).

Increasing house prices will usually lead to construction of more dwellings as governmental interventions will be put in place to increase supply. This will put downward pressure on house prices over time and the effect will be strengthened if demand has declined when the new dwellings are completed (Jacobsen, D. E., & Naug, B. E., 2004).

In the short term, high house prices are a function of high demand where growth in disposable income and wealth effect demand positively (Gallin, J., 2006). Buying a house is one of the biggest investments for households and is often funded by credit, hence the interest rate is of large importance. A high interest rate increase the interest costs which gives higher return of money when deposited in the bank. In this situation households are more likely to save than invest which will reduce demand. On the other hand, it would be more desirable to buy when the interest rate is low and consequently demand would increase.

As a high proportion of housing investments are founded by credit, the government lending policies and new regulations have great impact on the ability to repay debt.In general, higher disposable income increase housing demand, but other factors have indirect impact on income as well. Expectations of future income will have the same effect, in example; a prospected low growth in the labor market paired with high unemployment rates decrease demand, as households´ future earnings are uncertain (Jacobsen, D. E., & Naug, B. E., 2004). At the same time, total housing demand will also depend on the size of the population and the number of individuals in the work force. If housing demand is higher than housing supply it will lead to higher prices, and vice versa.

A more thorough identification of the factors affecting both sides will be further highlighted in the next chapter.

2.2. Bubble Theory

There are numerous definitions of what a housing bubble is and hence if it currently exists a bubble in a certain market (Lind, H., 2009). Furthermore, experts typically have different opinions on this topic as their view tend to be based on different factors and slightly different definitions that leads them to conclude in opposite directions (Krainer, J., 2003). Some even argue that there is no such thing as a housing bubble, which is explained by that market prices always reflect the economic fundamentals, and that sharp declines in asset prices usually reflect ´policy switching´ by government or central banks (Brooks C., 2008).

Despite these issues, it is still argued that there is a need for a definition of the term bubble based on the fact that asset prices develop very differently in different time periods due to the extreme price movements (Lind, H., 2009). These movements are related to periods in which prices tend to first increase rapidly followed by price drop, where prices fall back to (or close to) its original value (Lind, H., 2009).

A well-known definition by economist Stiglitz, J. E. (1990, p. 13) defines a housing bubble as: "if the reason that the price is high today is only because investors believe that the selling price will be high tomorrow- when ´fundamental´ factors do not seem to justify such a price- then a bubble exists".

Lind, H., (2009) paper criticizes the above based on the argument that the definition does not take a bubble episode into consideration. Meaning that both a price increase and a price decrease needs to be included. The author stresses the vagueness of the explanation as it is directly related to a price increase based on fundamentals and not to what causes a fall. He further argues that a definition to avoid these problems should only include a focus on the specific development of prices and not on the reason for the developments, and defines a bubble as: "There is a bubble if the (real) price of an asset first increase dramatically over a period of several months or years and then almost immediately falls dramatically" (Lind, H., 2009, p. 80).

There are different views as to what ´a dramatic price increase´ would be. One way of explaining it could be that real prices must at least double during a five-year period and that real prices have increased with at least 50% during a three-year period. The distinction between what is a related period or not is crucial as in considering to the period between the time when prices peaks and the

time when they start falling. If this period is too long (1-2 years are suggested by Lind) the price movements would be two separate events (Lind, H., 2009).

Based on the different views explained above, it is necessary with a combination of different definitions to ensure the inclusion of different factors that may affect this complex topic. Therefore, it is of importance to have a definition that does not draw a conclusion in either direction.

2.2.1 Minsky´s framework

To get a clearer overview of how a bubble behaves, an explanatory description of the existence of a bubble will be outlined through Minsky´s framework. Bunnermeier, M. K., & Oehmke, M., (2013) criticizes other models of only focusing on part of the Minsky framework, for instance by only generating the explosive price path, but ignoring trading volumes, or vice versa. The thesis concludes that to get a distinct overview of more aspects of a bubble, the Minsky model can be used as a guideline – but it is not exclusive as will be further explained below.

Minsky argued that there exists a positive correlation between the supply of credit and asset prices. Supply of credit increase when the economy is growing and decrease when it falls (Kindleberger, C., & Aliber, R.Z., 2005).

The five phases are outlined below (Bunnermeier, M. K., & Oehmke, M., 2013)

1. An initial displacement phase, is the start of a potential bubble triggered by changes such as technology or financial innovation. These changes lead to expectations of increased profit and economic growth.

2. The Boom phase is characterized by low unpredictability, the raise in investors optimism about the future leads to an increase in their willingness to borrow to further increase their investments. This reflect the housing prices upwards and might reach a level where prices exceed the actual fundamental improvements from the innovation.

3. The price expansion takes an explosive turn which leads to the phase of euphoria. Here, individuals tend to have indication towards an existence of a bubble, but are still confident that the market demand is still high in the future for it to be beneficial to invest.

4. The Profit taking phase is a result from real world events such as government policy changes. The phase starts off with enough demand from less sophisticated investors (i.e. new home buyers with less capital). It is argued that most of the investments before the downturn are financed with borrowed money, leading to investors making bigger interest payments than the return they get on their investment and hence become distressed sellers. The consequence is eventually a rapid price drop leading to a panic phase.

5. The Panic phase is where Investors (individuals) sell their houses at a rapid rate as they fear losing even more money if they wait, which reflects a downward price spiral. If the investments were financed with credit, it will lead to severe consequences as losses on the investments will make individuals have difficulties repay their debt.

2.2.2 Takeaway´s

Even though the above model categorizes different stages of a bubbles behavior in a clear way, it can also be looked at as too static and that important aspects of the cause of price fluctuations in the real estate market is not taken into consideration. This was argued by Kindleberger, C., & Aliber, R.Z., (2005), who stress that every crisis is unique with its individual features, in terms of the object of speculation and the form of credit developments.

Additionally, there is reasoning toward Minsky´s view about the supply of credit as being less relevant today due to more robust and strict structural arrangements in government and modern banking and more rapidly communication tools Kindleberger, C., & Aliber, R.Z., (2005). Even though, situations where the annual real estate price is three times higher than the interest rates on the funds borrowed to finance the asset purchase the view may still be of importance (Kindleberger, C., & Aliber, R.Z., 2005). As the Norwegian housing market as analyzed in this paper, has similar characteristics, we conclude that this view is relevant for our analysis.

2.3. Financial Stability

2.3.1. Financial stability defined

The aim of this section is to create a framework for what financial stability is, how it is monitored and further the pitfalls of not paying attention to this issue. Both in general and in Norway particularly. The topic of financial stability contains a broad aspect including financial systems-infrastructure, institutions and markets with both public and private actors as participants. The financial infrastructure includes financial regulations where the government work as a stabilizer to conduct monetary policy and maintain monetary stability (Schinasi, G. J., 2004).

As all these aspects are interlinked, disturbance in any of them threatens overall stability in the market, and stress the necessity to have a framework that identify, limit and deal with potential imbalances that may be a potential threat to the economy. A stable financial system is one that enhances economic performance in many dimensions (Mishkin, F., 1999). It also includes how well finance is facilitating economic and financial processes such as savings and investments, lending and borrowing. Together with economic and financial processes such as liquidity creation and disturbance, asset pricing and ultimately wealth accumulation and growth. On the other side, an unstable financial system is one that detracts from economic performance and requires massive intervention by authorities, including redefining the rules of the market place.

A good framework of financial stability improves a country´s capability of monitoring and stabilizing economic processes, manage risk and help re-stabilize and predict shocks. The interpretation of a definition of financial stability has been discussed for several years, and can be narrowed down to two categories; a direct explanation of the stability or indirectly through instability (Schinasi, G. J., 2004).

Mishkin, F., (1999, p. 6) defines financial instability as: “financial instability occurs when shocks to the financial system interfere with information flow so that the financial system can no longer do its job of channeling funds to those with productive investment opportunities”. The definition highlight the role of financial systems to provide credit to the real sector and stress the central role of asymmetric information in causing financial instability.

Whereas, the IMF working paper by Schinasi, G. J., (2004) defines financial stability through the direct explanation of the stability: “A financial system is in a range of stability whenever it is

capable of facilitating (rather than impeding) the performance of an economy, and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and unanticipated events", (Schinasi, G. J., 2004, p.8).

Allen, W. A., & W. G., (2006) do not classify asset price bubbles as financial instability. And refer to episodes of financial crisis where the suffering of households and companies are extreme. They argue that the public should be widely aware of how to avoid a distressed situation, based on previous episodes. It is stressed that households and companies have the choice to avoid suffering from financial crisis. This is a somewhat weak viewpoint and previous experience show that this is not always the case. When looking at financial markets, the stability can be disturbed both trough government interventions and outside shocks to the economy, that are out of the control of the public.[2]

2.3.2. Norway´s financial system

The financial system in Norway can be characterized as a bank based system. The banks dominate both the equity market as well as the foreign marked (Norges Bank, 2016). It is a system that aims at being robust to disturbance in the economy, so that it can facilitate financing, carry out payments, and redistribute risk in the best possible way.

The Norwegian financial system has three main tasks that will be efficiently performed in a well-functioning financial system (Norges Bank Papers, 2016). The tasks are outlined by the Norwegian central bank and includes;

1) Providing economic agents with borrowing and saving opportunities and channeling savings into profitable investment projects (intermediation)
2) Making payment transaction possible
3) Managing risk.

Furthermore, the financial system consists of three broad categories of agencies. The financial undertakings[3] act as intermediaries between savers and borrowers (investors). Further, it is only the

[2] This will be further discussed in the historical perspective in the next section and further in the part about Macroprudential policy.

[3] Financial undertakings: banks, mortgage companies, pension funds, insurance companies, securities funds.

bank that performs all the financial system´s three main tasks and the financial instruments are issued and traded in the financial markets. Insurance companies do not execute payments.

The financial infrastructure is the system where financial transactions between economic agents are performed, ensuring that payments and trades in financial instruments are recorded and settled. The legislation and standard agreements governing these processes are part of the financial infrastructure. The Norwegian central bank´s objective is to ensure stable economic stability as well as an efficient financial market in order to secure financing and risk distribution in the country (Norges Bank Papers, 2016). The financial crisis in 2008 demonstrated the huge costs an instability in the financial market may have as will be further described in the next section.

The responsibility of ensuring financial stability in the country is shared among the Ministry of finance (MoF), Financial Supervisory Authority of Norway (FSA) and The central bank (Norges Bank). Here, the MoF has the overriding responsibility of ensuring a well-functioning financial industry, as well as a key role of coordinating the three government bodies´ activities in case of a financial crisis (Norges Bank, 2014). FSA responsibility lies particularly in management and controlling financial institutions. Norges Bank is obligated to ensure a robust and efficient financial system with the monitoring of financial institutions and further identify trends that may weaken the stability of the financial system. If a situation that threaten the financial system may arise, these three authorities work together to strengthen the financial system (Norges Bank, 2014).

The central bank has the direct responsibility to act in limiting risk and prevent potential crisis. Consequently, they work continuously with the implementation of measures to strengthen the financial system for international and national shocks in the economy.

2.3.3. Risk monitoring

In the aftermath of the financial crisis, numerous countries recognized the importance of having rigid frameworks implemented to help identify financial imbalances in the economy. Consequently, a toolkit that enable authorities to have a more direct control and further influence the supply of credit was implemented. As previously stressed, the supply of credit has historically been of concern, as a lack of attention may potentially lead to tremendous consequences for a country´ financial stability and health. Therefore, the objective of macro prudential policy is to reduce potential system-wide distress (Galati, G., & Moessner, R., 2010).

In line with others, the Norwegian authorities have also implemented a number of instruments to mitigate financial system vulnerabilities since the financial crisis. In the scope of this thesis only the instrument related to tightening of residential mortgage loans will be examined. The Loan-to-value (LTV) ratio is a controlling device used to monitor risk before approving mortgages, and is calculated by dividing the value of the mortgage loan by the house price, (Jácome, L. I. & Mitra, S., 2015). The percentage tells the financial institutions about the risk level associated with each specific situation, where a higher ratio is associated with greater risk. Empirical evidence from international studies has shown that lending requirements influences household debt, and to some extend the housing prices (Jácome, L. I. & Mitra, S., 2015).

2.3.4. Loan to value (LTV) ratio in Norway

The LTV was first introduced in Norway in March 2010. The implementation was done by the FSA and intended to act as a guideline for banks in relation to residual mortgage. In the first intervention, the LTV ratio level was set to not exceed 90% including additional collateral. Then, almost a year later in December 2011 a LTV tightening was implemented with an 85% including collateral. Although, both these interventions were only guidelines and not regulated by law, it still gave an indication for a framework to follow in giving out loans and to monitor the supply of credit. In June 2015, the LTV guidelines were formalized as a regulation and further tightened to a LTV level of 85% (Norges Bank, 2016).

Due to the expansion of debt in 2016 that exceeded more than five times gross income, a new and tighter regulation was implemented in January 2017. An additional feature in the regulation is that the banks´ have some flexibility in deviating from the LTV limit (Norges Bank, 2017). For Norway as a whole, the percentage deviation is 10%, whereas an additional tightening is implemented for the capital region of only 8% (Hægeland, T., 2017). The new regulation for 2017 goes beyond the scope of the time frame of this thesis, but is an interesting focus for further research.

3. Earlier studies

3.1. What drives the house prices?

In this section, a variety of different studies conducted on the Norwegian market will be examined and hence relevant empirical findings will be highlighted to get an overview of what factors previous researchers have found that could trigger the house prices in the country. Furthermore, these findings will be combined with statistics of the economy, which together will form the platform for the underlying factors for investigation in this thesis.

To help monitor financial stability, it is helpful to look at empirical tests and models that measure whether house prices are overvalued in relation to fundamentals or whether we see significant signs that fundamentals can explain price fluctuations (Jacobsen, D. H., & Naug, B. E., (2005). The article published for the Norwegian bank, by Jacobsen, D. H., & Naug, B. E., (2005) investigate the drivers behind the Norwegian house prices by using quarterly data for the period 1990 to the first quarter of 2004. The study is based on country specific data through regression analysis. The empirical results found that housing construction, unemployment and household income all have an impact on the house prices, but that interest rates have the strongest effect. Moreover, the article state that the explanation behind the rising house prices since year 2003 is due to a fall in interest rates (Jacobsen, D. H., & Naug, B. E., 2005). They conclude that there is no evidence that the house prices are overvalued based on the fundamental factors under investigation.

Other variables such as the debt level was also included in their empirical test. The article showed that development in the housing market have contributed to a 10-11% increase in household debt per year since 2000. This has made households more vulnerable to negative economic disturbance. At the same time, the empirical study did not find significant results of the debt effect on house prices- either when the debt variable where included throughout the estimated period or when only a debt effect where included for a more distinct period (1990-1993), (Jacobsen, D. H., & Naug, B. E., 2005). The results are an indication that lending is not limited by government regulations in the estimated period (Jacobsen, D. H., & Naug, B. E., 2005).

In relation to this, a paper published by the same authors is of relevance (Jacobsen, D. H., & Naug, B. E., 2004). It aimed at identifying factors that influenced the growth of household debt, and hence how this growth is connected to the development in the housing market. The Norwegian market is examined between year 1994 and 2004 and found that debt growth was related to developments in

the housing market and to the decline in interest rates since December 2002. They further state that the strong growth in debt is associated with expanded house prices and that there is a time lag on the effect of debt for house prices. According to Jacobsen, D. H., & Naug, B. E., (2004) it takes a about a year from the prices begin to decline until the correlated effect is shown on the debt level, and vice versa. The described time lag was also found by Amundsen, A. K., & Jansen, E. S. (2011) which investigated the interactions between house prices and household credit, both short term and long term. Through their analysis, they found a strong correlation between housing prices and credit in the long run. In the short- run they only found correlations between credit influence on house prices but only an indirect relationship between household's price effects on credit. Credit available is crucial for the housing market – as the purchase of a dwelling is one of the biggest financial investments a household make and hence, stricter lending rules may force households without enough capital out of the market (Larsen, E. R. & Sommervoll, D. E., 2003).

Another article, by the Norwegian economist Ola Grytten, studied the existence of a bubble in the Norwegian market in 2009 by examining historical bubbles in the last 200 years (Grytten, O., 2009). Construction costs, long term liquidity effects, international price fluctuations, credit and wealth was the factors examined. It especially highlights the impact of construction costs and disposable income relative to house prices. He further stresses that the prices are not overvalued if the high level of house prices is a result of raising building costs for new dwellings. Furthermore, he emphasizes that new dwellings and old dwellings are complimentary (Grytten, O., 2009).

According to Grytten, O., (2009) others have argued that the reason for the price increase is due to expanding wealth in Norway in the recent years. Furthermore, he argues that this increase in buying power has led people to invest in the housing market, which in turn have pushed the prices up. By comparing statistics of disposable income with credit relative to house prices, he finds that disposable income has increased by 80%, whereas house prices has increased as much as 230% in the same period. This indicates that the increased buying power towards dwellings cannot be caused by income alone. Consequently, he finds a strong correlation between credit volume and house prices. Grytten, O., (2009) concludes that, based on the factors examined above, Norway was in a bubble in 2009- due to large positive deviations from the indicated long term equilibrium.

It is stated that population movements and demographic differences influence housing prices through wage income-, even though Jacobsen, D. H., & Naug, B. E., (2005) found that it is difficult to identify the effect as these changes slowly over time. Larsen, E. R. (2005) highlights the housing

market as a dynamic marketplace where the level of price fluctuations relative to housing is regulated by population and the housing price. A bigger population is reflected by higher housing demand and hence the price will increase. Further, when there is weak correlation between the population profile and the housing profile in a market, meaning that the people wanting to buy don't find the dwellings suitable for them (this can be in terms of i.e. price and location etc.) then demand decrease. In order for the economy to balance, the house prices will then adjust (decrease) to fit demand. If the population wanting to buy houses exceed the dwellings available for sale, then the price will go up and vice versa. This will again affect the construction costs – as production will increase when housing demand exceed housing supply (Larsen, E. R., 2005). Further, as it takes time to complete new dwellings, there is a risk that demand declines before the dwellings are complete- this will put a downward pressure on house prices over time (Jacobsen, D. H., & Naug, B. E., 2005).

3.1.1 The impact of regional differences

Some studies have looked at regional differences and found these varieties as explanatory variables in house price movements.

Larsen, E. R., (2005) studied explanatory factors behind the house price increase in Norway the last 12 years. It was found that the house prices in big cities have increased more than in smaller places. The author refers to the underlying reason as a ´café late effect´. That is, where the expanding migration to bigger cities can be explained by people's preferences about an urban and trendy lifestyle, together with a broader work market (Larsen, E. R., 2005)

As the housing market is directly related to the work marked, regions with high unemployment and migration will have a lower demand for houses. This in turn will set the market prices way below construction cost for dwellings (Larsen, E. R. & Sommervoll, D. E., 2003). The price formation in large urban cities is more complex, typically due to area shortages, which limits the overall development of new apartment buildings and housing (Larsen, E. R. & Sommervoll, D. E., 2003).

Some criticizes assessments such as the above to be too vague, and that there is a need for more thorough empirical testing. That is, instead of applying econometric tests, the studies tend to make

conclusions based on description of statistical information or examine house price measures[4] (Hu, Y., & Oxley, L., 2016). In the aftermath of such studies, several empirical studies focusing on regional differences have been conducted.

A variety of empirical studies have found variations among regions in a country, and evidence that there tend to be a tendency of a conduction of multiple regional bubbles, rather than a national wide bubble.

Jacobsen, D. H., & Naug, B. E., (2005) tested the effects of unemployment on the housing market in their empirical analysis and concluded that increased unemployment lead to expectations of lower wage growth and increased uncertainty about future ability to repay debt. This will in turn reduce supply of credit for households. The article further argued that net migration to central areas has been positive in recent years, which has effected regional house prices in various ways- and may also have changed average house prices for the country (Jacobsen, D. H., & Naug, B. E., 2005)

A recent study investigated the presence of a bubble at the U.S. state level, using state level data from 1975 to December 2014 in fifty U.S. states. By applying a right tailed unit root test through a generalized sup ADF (SADF) procedure[5] (Hu, Y., & Oxley, L., 2016). The analysis was conducted as a consequence of the dramatic price boom during the 2000s in several of the U.S. states. Twenty out of fifty states under investigation exposed bubble tendencies, hence the empirical result finds evidence of bubbles in several states which matches with other studies existing studies investigating the same (Hu, Y., & Oxley, L., 2016). They found that there were regional bubbles in the early 2000s and not national.

By applying econometric tests for the Israeli market from the period 2008-2013, the paper by Caspi, I., (2015) aims at identifying whether the house price expansion in Israel is due to a national or a regional bubble (Caspi, I., 2015). The author argues the importance of conducting regional analysis, in order to detect potential bubbles that exists in one, or several of the regions, which cannot be detected on the national level due to the averaging nature of aggregate national data. The nine regions were tested with regional data on the home price to rent ratio, while controlling for

[4] House price measure: e.g., house price, price-income ratio or price-rent ratio.
[5] A method developed by Pphilips, Wu & Yu (2013) a developed econometric method that helps identifying multiple bubbles over a long historical period From the paper; Testing for Multiple Bubbles 1: Historical Epoisodes of Exuberance and Collapse in the S&P 500*

various fundamental factors, including interest rates, income and the leverage ratio (Caspi, I., 2015). The results indicate that the recent housing price appreciations at the national and regional levels are consistent with the developments of the fundamentals- supply and demand factors that are represented by rent payments and interest rates., and not with a housing bubble scenario (Caspi, I., 2015).

Case, K. E., & Shiller, R. J. (2003) investigated the stability of the relationship between income, and their effect on home prices on the other. By conducting regional data from fifty US states, including the District of Columbia. The authors performed linear and log-linear regression with three dependent variables; level of home prices and price to income ration. The fundamental factors under investigation where; personal income per capita, population, employment change, housing starts and average mortgage interest.

The results indicated the states under investigation to fall into two categories; In most states, income and home prices were highly correlated, meaning that income alone almost completely explained the home price increase. Whereas in the remaining states, were prices was more volatile, the movement in other fundamental proxies had greater value in the cause of the house price increase. Restriction in supply may reflect low housing starts, which in turn push prices upwards. While on the other hand, builders will respond to a higher price by building more. On the demand side, changes in employment also affect the price. When home prices are expanding, this will have a negative effect on employment growth as the attraction towards a region with high housing costs will be reduced (Case, K. E., & Shiller, R. J., 2003).

3.2 LTV ratio´s in action

Limits on Loan to Value ratio is one of the tools more frequently implemented in varies countries to control the systematic risk in relation to expanding house prices and credit. It further aims at mitigating the effect of shocks on the housing sector, and thus on economic and financial stability. Empirical evidence from international studies has shown lending requirements to have influences on household debt, and to some extend the housing prices, (Jácome, L. I. & Mitra, S., 2015). A variety of studies will be examined below to get a broader picture of the previous studies conducted on the field.

According to Jácome, L. I. & Mitra, S., (2015), 47 countries LTV limits implemented in 2015, of which only 27 out of these changed the ratio restrictions later on to adjust for financial stability. In Europe, Norway is one out of 10 countries which conducted this adjustment since year 2000 (Jácome, L. I. & Mitra, S., 2015). The authors further stress that there is lack of evidence towards the exact effect of these tools, how they work in practice and what indicators that will trigger a further tightening.

The study by Jácome, L. I. & Mitra, S., (2015) aims at filling this gap, by investigating the LTVs effect on five countries in emerging and advanced economies. The countries under analysis shared similar features in terms of rapidly expanding credit for households, with corresponding historical low interest rates countrywide. Starting from the late 2000s, after the financial crisis. The objective of implementing LTV limits were majorly done in order to reduce credit growth and prevent a house price boom. In the countries under investigation, the LTV limits were usually tightened when the wanted effect was not met, for example in situations where house prices and mortgage credit did not fall. When assessing the effectiveness of LTV in meeting its objective, the empirical evidence confirmed that a LTV tightening of ten percent corresponded to a ten percent decline in house prices.

Another study used dummy variables to identify the effect of the tightening or loosening phases of LTV. Using regressions with cross-country panel data for the period 2002-2013, the quarterly change in real house price growth as well as the monthly credit growth change were examined. The authors found greater empirical evidence on the tightening of the ratio as this change tends to have a long-lasting effect on real house price growth and credit. Furthermore, a ten-percentage point lower LTV limit had a small but significant effect in lowering the level of mortgage credit by 0.7 percent over time, and counterintuitive effects on real house prices Duca, J. V., et. al., (2011).

A recent IMF working paper emphasises the importance of having effective macro-prudential instruments implemented to detect and mitigate potential financial imbalances (Tressel, T. & Zhang, Y. S., 2016). It further uses the Euro Area Bank Lending Survey[6] to conduct panel data regression of quarterly data for the period between 2003 and 2013 covering 13 Euro Area countries

[6] The Euro-system Bank Lending Survey (BLS) contains information on overall changes in lending standards, or net tightening of lending standards and changes in lending standards related to non-price factors (LTVs, collateral requirements, maturity), price factors (such as margins) and factors contributing to the changes in lending standards, including balance sheet characteristics (such as capital and liquidity ratios) which can be mapped to specific macroprudential targets set by national regulators.

(Tressel, T. & Zhang, Y. S., 2016). To assess the effectiveness of the policies in adjusting credit growth and house price appreciation in mortgage markets. The authors found that in situations where monetary policy are loose, Loan – to – value ratios are more effective. It further argues that there is a lack of knowledge about whether limits on LTV helps stabilize appreciation of house prices or mortgage credit (Tressel, T. & Zhang, Y. S., 2016).

McDonald, C., (2015) argues that previous studies have shown that limits on LTV can help stabilize the housing market and that a tightening will be more effective than a loosening. By using time series regression with quarterly data from 17 economies that accounted for the most active users of macro prudential policy, the intention was to estimate the before and after effect of the LTV. The indicators for the analysis was real housing credit growth and real house price inflation. The paper found that a tightening had greater effect when credit is expanding quickly or when house prices are high relative to income. Further, the results suggested that house prices tend to fall following a tightening and that the decline is greater when it corresponds to high credit growth. The results suggest a bigger effect during booms (McDonald, C., 2015).

Crowe, C., et. al., (2011) highlight evidence on the link between LTV and house price fluctuation. With the use of cross-sectional analysis of 21 developed countries, it was found that maximum LTV limits are positively related to house price appreciation between 2000 and 2007. This suggest a 10% increase in maximum LTV allowed by regulations to be associated with a 13% increase in nominal house prices (Crowe, C., et. al., 2011).

According to IMF reports there has not been any direct studies on the effect of LTV ratio caps (loosening/tightening) in relation to house prices, focusing on Norway particularly (Tressel, T. & Zhang, Y. S., 2016), (Jácome, L. I. & Mitra, S., (2015). Moreover, there is a lack of empirical evidence in general on both emerging countries and especially towards advanced economies such as Norway (Tressel, T. & Zhang, Y. S., 2016). Literature emphasizes that even though some studies show that a tightening of LTV lead to a decline in house price appreciation, and vice versa, there is a lack of evidence on how LTV ratio work in practice. Further, whether limits on LTVs could significantly slow down house price appreciation and/or mortgage loan growth.

An IMF study examine the Canadian market and aims to assess the effectiveness of the policy measures taken by the Canadian authorities to address the extreme price increase in housing (Krznar, I., & M, J., 2014). The paper stress that the house price growth together with the expansion

in mortgage credit, threatens financial stability in the country. As such, the article assesses the effectiveness of four macro prudential policies implemented by the Canadian government in four different years (one of these measures are LTV ratio). The empirical study examined whether the policies have influenced housing prices and mortgage debt (Krznar, I., & M, J., 2014). This is done with the help of two estimated separate equations, one for mortgage credit and one for house prices.

The mortgage credit equation includes the unemployment rate, hourly wage growth, mortgage interest rate, house price growth. Further, a dummy variable equals to 1 in months following the implementation of a MPP and zero otherwise. This to test the impact over the 3, 6 and 9 months after being introduced, and for the whole period between rounds (Krznar, I., & M, J., 2014).

Whereas the house price equation included the following; growth rate of number of completed houses, mortgage credit growth, nominal GDP growth, growth of sales of existing houses. No macro prudential dummies were included in the house price equation as it is assumed that macro prudential measures affect house prices indirectly through mortgage credit. The study conclude that LTV restriction is one of the measures with the largest most effect on the house prices and credit growth. And further suggest that a one percentage point reduction in the maximum LTV ratio lowers annual mortgage credit growth by about ¼ to ½ percentage point (Krznar, I., & M, J., 2014).

From the Norwegian study by Jacobsen, D. E., & Naug, B. E., (2004) with the title ´what influence the growth of household debt´, the authors specifically analyze the Norwegian market with the purpose to identify factors influencing the growth of household debt. By estimating a model with quarterly data for the period 1994-2004.

The model included the following factors: house prices, the housing stock, the number of house sales, banks´ lending rate, the unemployment rate, total wage income in the economy and the number of students aged 20-24 as a share of the population. The outcome of the study was that interest rate, unemployment, disposable income construction and housing stock were the factors most influencing the house prices and the corresponding growth of debt. Where it is highlighted that the low interest rate since the 4th quarter of December 2002 have had considerably effect by boosting both house prices and debt (Jacobsen, D. E., & Naug, B. E., 2004).

3.3. The focus in the thesis

This thesis will focus on the differences between regions. Due to lack of regional data available on housing stock and number of house sales, these will not be included in the analyses. Housing start and finished dwellings will be included instead, as due to previous empirical research, these factors tend to affect the house prices through demand. As the thesis will be focusing on the differences between regions, country wide measures such as GDP will not be of relevance. The thesis will rather investigate factors highlighted in the previous studies section on regional studies.

Instead of testing for a variety of macro prudential tools, this thesis will only look at the effect of LTV in Norway. With the reason being that the study done on the Canadian market found that LTV was the most effective tool on the effect on household and credit. Further, that there is a lack of empirical evidence on the field according to IMF reports (Krznar, I., & Mosink, J., 2014). To take it further I will focus on regional differences instead of the country as a whole which will give a somewhat different perspective.

As highlighted from the analysis above, the demographic characteristics within regions may affect house prices and debt differently. For instance, the trend of moving closer to big cities with greater work opportunities influence population growth which in turn will have an impact on unemployment rate, disposable income and the level of new constructions. This in turn will, as previously explained, have an impact on households´ ability to repay debt. Further, the differences in the correlation strength to the fundamental factors differ in regions with more volatile house prices. In this thesis, Norway will be used as a case study to see what different characteristics in a region may have on the contribution to fluctuations in house prices and households´ debt. In combination with highlighted factors and the previously empirical findings from the section above, the following factors will be used in the analysis;

Dependent variables	**House prices**	**House prices**	**Household debt**
Independent variables	Housing start finished dwellings disposable income lending rate unemployment rate population growth above 67	Single living alone Couples with kids Couples without kids	disposable income lending rate unemployment rate above 67

Table. 3.1.

4. Historical and regional development

4.1 The housing market & the credit market

The Norwegian housing politics goes all the way back to 1945 and was originally based on the principle that everyone should have the same rights and opportunities Gram, B. A., (2011). As such, the house prices were regulated by the government with the underlying assumption that household expenditure should not exceed 20% of the wage of an average industrial worker. Norwegian housing had its cornerstone where every household had the right to own their homes. This was also demonstrated by the Norwegian Government who created affordable housing through purchasing available land and selling it cheaply to construction projects (Gram, B. A., 2011).

After the deregulation of the financial sector in the 1980s, the political detailed oriented steering was substituted by market mechanisms. With the aim that the market should fluctuate and stabilize itself without direction of the state (Senneset, K., & Øye, B., 2014). The general subsidizing- that everyone should be treated equally and own a place to live was downgraded and a more selective focus was put in place, with subsidies only for the less fortunate of the population. As a consequence, households and other subsidiary easier received loans, even though it was an attempt to control the credit growth. Banks' lending rose by approximately 20% annual which was followed by a bank crisis. Easy access to loans and no regulations in place to monitor peoples´ creditworthiness, ended with huge bank losses when the public could not pay their loans. The banks collateral exploded and resulted in a dramatic fall in the real estate market (Jansen, E. S., & Krogh, T. S. H., 2011). Consequently, the banks and the financial sector faced great losses and it was the first time in history that the average annual loss exceeded the interest received from loans. To decrease the expansion of credit, the monetary and credit policy was tightened in 1986, and was in place until the end of 1980s.

The economic downturn continued in the 1990s as a result of falling oil prices, tight inflation practices and increasing interest rates. In this period, the state financed almost all housing construction. The general substitute that was in place for everyone was replaced by better terms on loan agreements for the less fortunate. This change also involved the financial institutions where same procedures for all types of financial institutions were sat, in example that the amount of collateral needed to be at the same level for the general public (Gram, B. A., 2011).

After the deregulation, the housing construction was sufficiently regulated by the marked forces. Then, in 1995 there was a shift, where there was only minor correlation between housing construction and fluctuations in the housing market. The reason for this was due to stricter rules and regulations due to construction of housing and a desire to reduce population growth through restriction on construction of housing. These factors lead to that the lack of new construction was a result of tight restrictions and not by the market forces as was the intention of the deregulation (Jansen, E. S., & Krogh, T. S. H., 2011).

In 2008, there was a global financial crisis with its offspring in the United States that had the same characteristics as Norway experienced in 1990s. An explosion of lending supply that resulted in bankruptcy as people could not repay their loans. Norway was one of few countries that was not as negatively affected, but it was a reaction in terms of higher lending rates and a tighter restriction on banks' lending supply. This caused a reduction in the real estate market and in turn households demand. Correspondingly, there was an increased interest in the vulnerability of financial imbalances in the economy as well as in monitoring potential threats- as it had been seen to cause severe problems for a country (Jansen, E. S., & Krogh, T. S. H., 2011).

4.2 The housing market

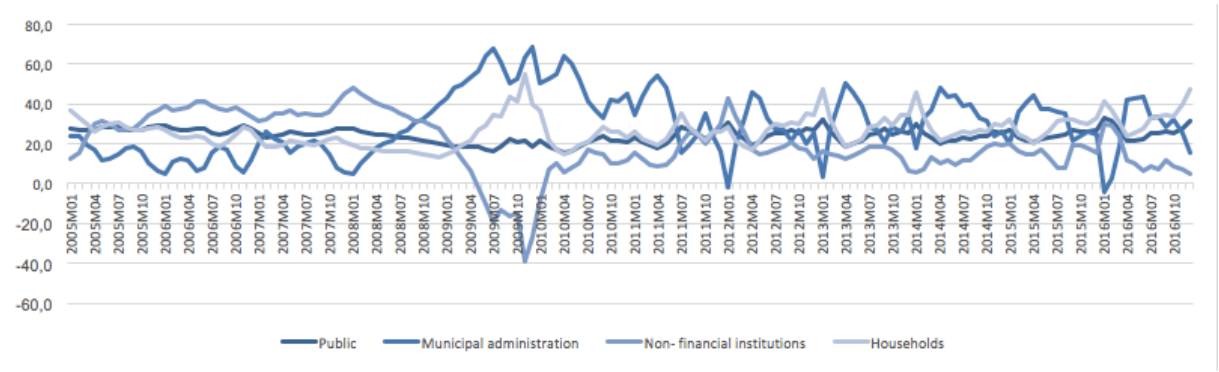
The housing prices has expanded tremendously the last 20 years (Senneset, K., & Øye, B., 2014). Some reason to this can be explained by the tight restriction on construction of dwellings – which have ensured demand to exceed supply. The strong increase in household's disposable income, low rents and strong population growth from the mid 2000s has led to an expansion in demand.

High disposable income and population growth reflect greater buying power, which increase households available proportion to spend on housing without reducing other consumption products (Senneset, K., & Øye, B., 2014). Consequently, this has affected household debt, as increased buying power is correlated with greater credit worthiness and hence with a rise in housing demand, increasing house prices is expected.

Strong debt increase the risk of instability in the financial system and it is therefore crucial to monitor the debt level. The central bank of Norway (Norges Bank) make the use of statistics, a credit indicator and a variety of microdata sources to analyze the debt development in the economy

Almklov, G., et. al., 2006). The microdata includes the banks accounting reports, income statistics for household as well as annual accounts. Historically speaking, periods with strong debt expansion is the basis for financial instability. Therefore, to be able to monitor financial instability, it is important to look at the total credit volume.

Today, the credit market in Norway is comprised of two measures indicating the credit fluctuation in the economy. These indicators are referred to as K2 and K3, where K2 measures the credit at national level whereas the latter includes the credit provided from international brokers. The indicators describe the populations´ net debt and is a good indicator for predicting the development in the real economy. At the same time, it gives an overview of the different sectors financial position and is therefore a useful tool in analyzing the country´s financial stability. Due to the expansion of debt the last years for both households and corporations a change in the interest rate will have a great impact on the ability to pay off their debt (Almklov, G., et. al., 2006).



Source: Statistics Norway (SSB) **Fig. 4.1.**

As seen in the graph, households account for a great portion of the total national credit for the public. Consequently, the development in the households' economy is important for the finance institutions credit risk. Historically, there has been huge losses on loan payments in the household sector compared to corporations. Therefore, an economic downturn for households and a reduction of their buying power will have great negative impact on the country in general. For instance, increased interest rates affect households negatively as they must spend a greater share of their disposable income to pay off their debt and thus will have a greater desire to save.

The relationship between banks´ lending rate (which is the interest rate individuals pay on their mortgage loan) and the house prices for the analyzed period is displayed Appendix 3. Here we see that they move in opposite directions, house prices increase when lending rate is low and vice versa. These factors combined will make households reduce their consumption, which in turn will affect the economy. Weaker demand for consumption goods will affect economic production and employment. Therefore, the household´s debt expansion is a critical topic that needs to be closely monitored to the health of the financial stability.

4.3 Demographic differences in the house prices in Norway

This section will point out different characteristics between the seven regions under investigation. As seen from both the graph on house price development as well as the graphs to the right, there are major demographic differences in the country which is relevant to examine. The most significant characteristics for each region that may have affected the development over the analyzed period is highlighted for each region below.

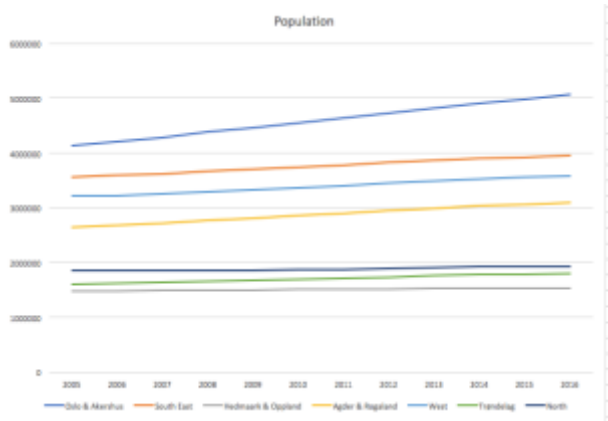


Fig. 4.2.

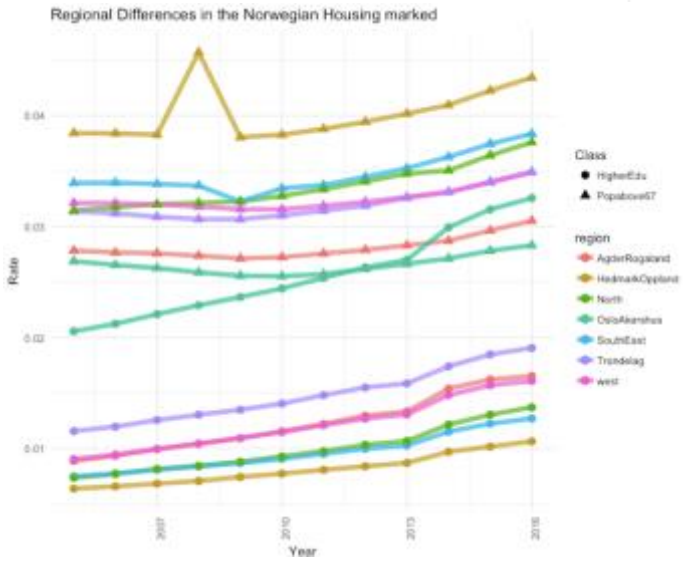


Fig. 4.3.

We see an overall expansion of higher education from 2013 and until today, with a more rapidly growth than the years before. Though, Norway has only 8 university institutions where Hedmark & Oppland together with South East, are the only two regions without a localization of a university.

Appendix 2 highlight that household debt exceeds disposable income in all regions.

Oslo & Akershus

This region includes the country's capital and is characterized by a high educated population as well as rapidly growing population over time. Two out of the total eight universities are in this region. House prices have been rapidly expanding with a more extreme increase starting from 2014 and until the end of the analysed period (see figure 1.2)

Agder & Rogaland

This region is characterised as the centre of oil and petroleum export in the country, where the greatest proportion of the industry has been employed from the region. The workforce has therefore been driven majorly by oil and gas and hence fluctuation in this area is therefore very sensitive to the economy (Berthelsen, O. & Nagel, T. C., 2016, April 25)

2008 was reflected by the highest oil price in history, followed by a slightly reduction the following year because of the global financial crisis. Then it rose rapidly from 2010 until the third quarter of 2014 when the oil prices dropped dramatically. The oil prices per unit declined more than half of its previous value and has remained stable to the end of the analyzed period (Meyer, C., 2016). From having a stable unemployment rate, it rose dramatically from the fourth quarter of 2014, and the debt level exploded.

South East

South east is characterized by having the highest unemployment rate for the entire analyzed period compared to all regions. No universities are in this region, which is reflected in low population with higher education.

Trøndelag

Low and stable unemployment rate and the second highest educated population based on their population amount. The region has one university which may explain the high proportion of highly educated people. Their population above 67 has been stable, but slightly raising over the period.

West

The region has one university which is reflected by a relatively high amount of the population with higher education. Unemployment is stable over time until it starts expanding rapidly from the fourth quarter of 2014. The proportion of the population above 67 is relatively average, compared to the other regions.

Hedmark & Oppland

There are no universities located in this region which can be the reason for the remarkably low proportion of their population with higher education. The population amount is the lowest among all and further population growth is almost non-existent. Based on this, there is not a surprise that the house price growth is relatively weak over the years.

North

This region has the greatest spread of demographic distance of all but also one of the lowest amount of population. Indicating that the households are relatively spread over the region. Even though the region as a whole has two universities, the low educated population is probably due to the spread of the population and that the distance to the universities may be far away for the majority. Furthermore, as the only region in the country it has one unique tax regulation. Part of the region has specific economic advantages in form of annual reduction of student loan of up to 25.000 NOK, lower income tax, general tax deduction and lower electricity costs. The reason for this is an attempt to make the more rural parts more attractive for the population as the economic advantages will make each household better wealth and hence higher buying power. (Forskrift om særlig skatteregler for Nord-Norge, 1954).

5. Data Analysis

5.1 Data collection

The house price index (Tabell 07221, Statistic Norway).

In order to compare the house prices of the different regions, a house price index performed by Statistic Norway was used. The advantage of using an index compared to actual numbers is that the price of a dwelling is usually quite different from region to region because of location, size, age and quality. A price index diminishes these characteristics and hence make it possible to compare the relationship of house price development between regions (Takle, M., 2012).

The regional house price indices' that was retrieved from Statistic Norway were only available with base year in 2015 (2015 = 100), an adjustment was therefore made to convert the base year to 2005 which reflect year of the analysed period. This was done by this basic equation: index number = (current year/ base year) ×100. The indices were both quarterly and seasonally adjusted.

Disposable income (table 06946, Statistic Norway)

Annually Income after tax (median) for each region.

Household debt (table 05662, Statistic Norway)

Annually household debt for each region.

For income and debt: These numbers are only reported at the end of each year due to the registration of the tax return. Therefore, the annual numbers were divided by four in all regressions. Because of the tax return lag of the registration of the data, the numbers for 2016 was not yet published when this thesis was written and submitted. An estimation of the 2016 numbers for both disposable income and household debt was therefore performed based on a report done by Statistic Norway of the financial outlook of the country in 2016 (Norges Bank Papers, 2016).

As the report does not take regional differences into consideration, the 2016 numbers will be based on a country wide measure. I am aware that this will not give a perfectly accurate picture as some regions may have changed slightly differently, but it is sufficient enough for the purpose of the thesis in analyzing the difference between regions.

According to the report, households´ disposable income had a reduction of 1.7% in 2016, the 2015 number for each region was therefore reduced by the same amount (2015 number x ((1- 1,7%)). The households´ debt level was prospected to be 5,7% higher than the year before on country basis. As the analysis does not say any specific about regions, the 5,7% will be added to the debt levels in 2015 which will form the level for 2016 (2015 number x (1+5,7%)).

Population & Population growth (table 01222, Statistic Norway)

Quarterly population numbers for each region was retrieved from Statistics Norway. Then the population growth was calculated using the percentage change from the last period (current-prior)/(prior). A percentage was used to better compare the different regions.

Above 67 (table 05277, Statistic Norway)

Only yearly numbers were available for this proxy. When quarterly numbers were needed, the actual number was first divided by four and then a percentage was calculated by dividing the amount by the population level of each region. A percentage was used to better compare the different regions.

Higher education (Table 09429, Statistic Norway)

Only yearly numbers were available for this proxy. When quarterly numbers were needed, the actual number was first divided by four and then a percentage was calculated by dividing the amount by the population level of each region. Higher education in this data series is defined as people who have finished a four year or longer education at university level.

Housing construction (table 03723, Statistic Norway)

Started dwellings: This data includes monthly data for the number of started dwellings for each month in each region. For the purpose of the thesis, three and three months were added together to get quarterly data.

Finished dwellings are by Statistics Norway defined as all dwelling completed and ready for sale. The quarterly calculations were done in the same way as above.

Unemployment rate

This data had was ordered from the Norwegain Labour and Welfare Administration (NAV). NAV is the only department In Norway that has statistics for regional and quarterly unemployment.

Banks lending rate (Table 08175, Statistic Norway)

This is an annual country wide rate that reflects the average percentage hosueholds have to pay on their mortgage loans. For the purpose of the regression, the same rate was used for all four quarters in each related year.

Household characteristics (table 10986, Statistic Norway)

The categories are: Those living alone, couples with children and couples without children. For the regression, the annual numbers are divided by four to get quarterly figures.

After being collected, the data were formatted and rearranged by using Microsoft Excel and then transferred into IBM SPSS for correlation and regression analysis. Excel and Rstudio were used to construct graphs (RStudio (2016).

5.2 Econometric Method

Econometrics is a technique of studying economic problems, and can be defined as "the application of statistical techniques to problems in finance" (Brooks, C., 2008, p. 1) and is a useful tool for predicting financial problems. In this thesis, time series data will be used, which is a process where the data conducted is gathered over a time period. This technique is frequently used when the observation of specific variables over time is of importance. It is used quarterly data from the first quarter of 2005 until the fourth quarter of 2016.

A linear multiple regression is used to test the hypothesis described above. A regression analysis is useful when the relationship between variables are of importance. Multiple regressions are used when more than one independent variable is used to explain the fluctuations in a dependent variable (Y). This can be explained through an equation where Y is the dependent variable under investigation, whereas x1, x2..k is the independent variables attempting to explain the value of Y (Brooks, C., 2008).

For regression results to be valid, there are varies assumptions that needs to be taken into consideration.

The assumption of multicollinearity is that the independent variables (IV) should not be too correlated with each other (Brooks, C., 2008). Whereas the dependent (DV) to independent variables should have high correlation. If there is no relationship between the IVs they are said to be orthogonal to one another. If this is the case, adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variable to change. In practice, some degree of association between the variables always occur. On the other hand, if the correlation is too high (above 0,7), the overall model may display an inflated R squared display a statistical significant model even though it is not. At the same time, the individual coefficients will have high standard errors, meaning that the regression looks significant whereas the individual variables are not significant. Furthermore, the regression becomes very sensitive to small changes in the specification, so that adding or removing an explanatory variable leads to large changes in the coefficient values or the significance of the other variables.

One way of detecting multicollinearity is by performing a correlation matrix of the variables.

In IBM SPSS multicollinearity can be tested in different ways. The Pearson correlation between the independent variables may cause problems as it will disturb the regression, meaning that it is not possible to tell what independent variable that causes the fluctuation in the dependent variable or of how much. A general rule is if the correlation between two independent variables is between -0,70 and 0,70 there is likely not a problem using both independent variables.

IBM SPSS also provide multicollinearity-diagnostics tables to ensure stronger evidence of no multicollinearity. Here the values of both VIF (variable inflation factor) and tolerance is displayed. VIF should be lower than 10 (where 5-10 is critical). Non-of the end results of the regressions had a VIF above 5. Further, the tolerance level must be greater than 0,2 (Brooks, C., 2008). This was also true for all regions.

Overfitting is cause by adding too many independent variables into the regression. This will hurt the relevance of the prediction and hence create more relationships between them. A general rule is that the number of observations (m) divided by the number of variables (n) should be less than 12 (m/n >12). As the number of observations of all samples were 48, the total independent variables that

should be in a regression at once is 4. This issue was taken care of by performing more than one regression where no more than three IVs were included at once.

In all regions, disposable income was strongly correlated (above .9) with both household debt and higher education. As highlighted in the theoretical overview as well as in the previous studies, disposable income is one of the variables that mostly explain house prices. Therefore, both household debt and higher education was removed from the house price equation.

Another basic underlying assumption for ensuring validity in a multiple regression is that the variables needs to be stationary (Brooks, C., 2008). If autocorrelation is not accounted for, the general rule is that R squared will be inflated and thus the model may seem more statistically significant than it is. In general, to identify if the regression model fit the data, and to what extent the independent variables explain the variability in the dependent variables, it is useful to look at the R squared (common goodness of fit statistics) of the regression result. A definition of R squared is ´the square of the correlation between the values of the dependent variable and the corresponding fitted values from the model´. A correlation coefficient must lie between 0 and 1. If this correlation is high, the model fits the data well, while if the correlation is low (close to zero), the data is not providing a good fit to the model (Brooks, C., 2008).

To account for potential issues with R squared, the adjusted R squared should also be taken into consideration. It reflects the loss of degree of freedom associated with adding extra variables. If these values are similar, it is a good sign for the fit of the data (Brooks, C., 2008).

As all regions show an R squared (as well as an adjusted R squared) of above ,9 indicating that the independent variables explain more than 90% of the fluctuations in the house prices in all regions. This would, according to literature suggest a ´no bubble´ situation as highlighted by Stiglitz, J. E. (1990, p. 13) in chapter 2?: “if the reason that the price is high today is only because investors believe that the selling price will be high tomorrow- when ´fundamental´ factors do not seem to justify such a price- then a bubble exists”.

In IBM SPSS a detection of a autocorrelation problem is given by the Durbin Watson (DW) statistic value. This should in general be close to 2, but was close to 1 for all regions. Therefore, it is suggested that the underlying autocorrelation needs to be removed. This can be done by using a HP-filter by calculating the lambda of 1600 as suggested for quarterly data by Hodrick, R. J., &

Prescott, E. C., (1997). The calculation leaves a trend for each series and when this is deducted from the original value it will leave a variable without any underlying trends or fluctuations.

On a side note, when this was performed all trends were removed and left the variables almost linear, which will not provide significant results. Without a significant value, it reflects that the variables are highly serie-oriented- suggesting bubble tendencies. Hence, when trying to make them stationary, the bubble tendencies are excluded and no trend is left to analyze the dependence. Therefore, a low DW according to literature is statistically not good, but logically it makes sense. The further results will therefore ignore a low DW based on the above assumptions. Further, focus on the statistically significant variables, as the fluctuations is of importance to identify the differences in regions and to answer the aim of the paper.

As described above, the aim of the paper is to identify differences between the regions and whether we see a relationship between this and the reflection of debt and LTV. Not to perform a perfect house price model, as the latter is not subsequent with the first. The next section will go on and describe the results conducted from each region with its corresponding significant results. The significant statistical level was sat to 95%, meaning that a value of sig. above ,05 will be rejected and not included in the results. This means that the even though these variables correlate, this may only be by chance and it cannot be drawn a line between the variables and the dependent variable as such.

5.3 Results

This section will outline the individual multiple regression results conducted for each region. Only 4 independent variables were included at the time to fulfill the m/n > 12 requirement explained in the chapter above. To analyze how much each of the IVs contributed to the fluctuations in DV, the part and partial correlations in the coefficient table was calculated. By taking the square root of the values, it leaves a percentage that explain the relationship.

5.3.1 House price fluctuations

House prices was sat as the dependent variable (DV) with a combination of the following as independent variables (IV): housing start, finished dwellings, disposable income, lending rate, unemployment rate, population growth and above 67.

Agder & Rogaland

Agder & Rogaland		
	The other IVs held cosntant	Unique contribution
disposable income	91,78 %	70,56 %
above 67	40,70 %	4,24 %

Fig. 5.1.

For this region, the only statistically significant variables were disposable income and those above 67. The outcome displays that 91,78% (40,7% for above 67) of the variance in the house prices can be explained by Disposable income when above 67 is held constant. When accounting for the IVs alone, 70,56% can be explained by the unique contribution of disposable income (4,24% by Above 67). According to the model, when above 67 is added, it increases the explanatory power of disposable income by 21,22%.

Hedmark & Oppland

Hedmark & Oppland		
	The other IVs held cosntant	Unique contribution
Disposable income	93,70 %	47,06 %
Lending rate	33,52 %	1,59 %
Above 67	12,74 %	0,46 %

Fig. 5.2.

The variables with significant results towards fluctuations in the house prices where disposable income (93,7 %), lending rate (33,52%) and above 67 (12,74)%. Here, the percentage in the brackets illustrate each variable contribute to the fluctuation in the house prices when the others are held constant. Whereas each unique contribution is 47, 96% (dispoasble income), 1,59% (lending rate) and 0,46% (above 67).

North

North		
	The other IVs held cosntant	Unique contribution
Disposable income	92,74 %	70,22 %
population growth	16,73 %	1,10 %

Fig. 5.3.

The statistically significant variables were Disposable income and population growth. When one of the variables are held constant, disposable income accounts for 92,74% of the variation in DV, and population growth for 16,73%. Whereas the unique contribution is 70,22 an 1,20% for disposable income and population growth respectively.

Oslo & Akershus

Oslo & Akershus		
	The other IVs held cosntant	Unique contribution
Disposable income	91,58 %	50,84 %
Above 67	47,61 %	4,28 %

Fig. 5.4.

Oslo & Akershus		
	The other IVs held cosntant	Unique contribution
Disposable income	91,58 %	77,97 %
Lending rate	20,34 %	1,82 %

Fig. 5.5.

The statistically significant variables were disposable income and the population above 67. When one of the variables were held constant, each contribution to the fluctuation in house prices was 91,58% for disposable income and 47,61% for above 67. Each unique contribution was 50,84% for DI and 4,28% for above 67. Only when those above 67 were excluded, then lending rate would show a significant level to the equation of a partial squared contribution (disposable income held constant) of 20,34% (91,56% for disposable income). Their unique contribution was then 77,97% for disposable income, and lending rate alone would contribute 1,82% to the variation.

South East

South East		
	The other IVs held cosntant	Unique contribution
Disposable income	96,04 %	25,91 %
Lending rate	49,42 %	1,04 %
Unemployment rate	51,55 %	1,12 %
Above 67	29,38 %	0,44 %

Fig. 5.6.

This region was the one with the most number of IVs showing statistically significant result for explaining the variation house prices. With the contribution of disposable Income, lending rate, unemployment rate and the percentage of those above 67. It was only started and finished dwellings that did not show a significant level below the 0,05 percentiles. Their contribution is shown in the diagram below, which display a lower unique contribution of disposable income than the other regions.

Trøndelag

Trøndelag		
	The other IVs held cosntant	Unique contribution
Disposable income	96,83 %	64,80 %
Housing start	35,16 %	1,14 %
Lending rate	9,99 %	0,23 %

Fig. 5.7.

This were the only the region which had statistically significant result of housing start in the combination of disposable income and lending rate. The contribution of the independent variables was disposable income (96,83%), housing start (35,16%) and lending rate (9,99)%. Here, the percentage in the brackets illustrate each variable contribute to the fluctuation in the house prices when the others are held constant. Whereas each unique contribution is 65,80% (disposable income), 1,14% (housing start) and 0,23% (lending rate).

West

West		
	The other IVs held cosntant	Unique contribution
Disposable income	95,3 %	84,3 %
Lending rate	19,2 %	1,0 %

Fig. 5.8.

West		
	The other IVs held cosntant	Unique contribution
Disposable income	90,63 %	37,95 %
Above 67	25,10 %	1,30 %

Fig. 5.9.

The statistically significant variables were disposable income and the population above 67. When one of the variables were held constant, each contribution to the fluctuation in DV was 90,63% for disposable income and 25,10% for above 67. Each unique contribution was 37,95% for disposable income and 1,30% for above 67. Only when those above 67 were excluded, then lending rate would show a significant level to the equation of a partial squared contribution (disposable income held constant) of 19,2% (95,3% for disposable income). And their unique contribution were then 84,3% for disposable income and lending rate alone would contribute 1,0% to the equation alone.

5.3.2 Households characteristics

Another regression was run to detect the contribution of different household's characteristics (single, couples with and without kids) to the variation in house prices. All regions except Oslo & Akershus and South East had extremely strong positive correlations between them all, and it is therefore not possible to identify which characteristics that contribute the most to the house prices in each region by using regression as a tool. This will be further discussed in the discussion part in the following chapter.

The correlation matrix for Oslo & Akershus (left) and South East (right) is shown below;

	HousePrice_index	Households_single	Households_couple_w/o_kids
HousePrice_index	1,000	,493	,940
Households_single	,493	1,000	,307
Households_couple_w/o_kids	,940	,307	1,000

Fig. 5.10.

	HousePrice_index	Households_single	Households_couple_w/o_kids
HousePrice_index	1,000	,836	,950
Households_single	,836	1,000	,688
Households_couple_w/o_kids	,950	,688	1,000

Fig. 5.11.

As seen in the tables, single households have a stronger correlation in South East than in Oslo & Akershus. A regression was run to identify the contribution of each variable to the variation in house price.

Oslo & Akershus		
	The other IVs held cosntant	Unique contribution
single	40,07 %	4,62 %
couples without kids	90,82 %	68,72 %

Fig. 5.12.

South East		
	The other IVs held cosntant	Unique contribution
single	65,12 %	6,35 %
couples without kids	88,74 %	26,63 %

Fig. 5.13.

5.3.3 Household debt & the LTV effect

The debt regression was run by using households´ debt as the dependent variable (DV) for each region, with a combination of the following as independent variables (IV): disposable income, lending rate, unemployment rate and above 67.

Firstly, a regression was first run without any LTV effect to see how the variables contributed to the model as well as how they correlated. Then an LTV effect was included using a dummy variable in the quarter it was implemented and in the following 3, 6 and 9 months after.

The value of 1 was given in the described quarters and a value of zero was given in the others. This is a method of using dummy variables to detect abnormal fluctuations in economic events (Brooks C., 2008).

Agder & Rogaland

In the correlation matrix, all the variables below were statistically significant to household debt with a sig. level below 0,05.

When the regression was run, it was identified that unemployment rate did not meet the level of significant level and was therefore excluded. The results from the others were as follows:

Hedmark & Oppland		
	The other IVs held constant	**Unique contribution**
Disposable income	99,00 %	52,85 %
Lending rate	54,76 %	0,71 %
Above 67	14,75 %	0,10 %

Fig. 5.14.

When adding the LTV dummy variable, the following results were:

Hedmark & Oppland		
	The other IVs held constant	**Unique contribution**
Disposable income	98,80 %	48,30 %
Lending rate	54,91 %	0,71 %
Above 67	14,06 %	0,10 %

Fig. 5.15.

The change between without and with was then:

Change		
	Partial	Part
Disposable income	0,20 %	4,55 %
Lending rate	-0,15 %	0,00 %
Above 67	0,68 %	0,01 %

Fig. 5.16.

<u>Hedmark & Oppland</u>

When running the correlation matrix, unemployment was not significant towards household debt and was therefore excluded. Leaving the results to be:

Agder & Rogaland		
	The other IVs held constant	**Unique contribution**
Disposable Income	99,00 %	43,30 %
Lening rate	37,21 %	0,26 %
Above 67	41,22 %	0,30 %

Fig. 5.17.

And with the LTV dummy effect:

Agder & Rogaland		
	The other IVs held constant	**Unique contribution**
Disposable Income	98,804 %	36,845 %
Lening rate	33,063 %	0,212 %
Above 67	41,732 %	0,303 %

Fig. 5.18.

The change between without and with was then:

Change		
	Partial	Part
Disposable Income	0,2 %	6,45 %
Lening rate	4,1 %	0,05 %
Above 67	-0,5 %	0,00 %

Fig. 5.19.

South East

When the regression was run, above 67 was not statistically significant and was therefore excluded. Leaving the results to be:

South East		
	The other IVs held constant	Unique contribution
Unemployment	47,33 %	0,42 %
Lending rate	65,93 %	0,92 %
Disposable income	99,40 %	87,42 %

Fig. 5.20.

With LTV effect:

South East		
	The other IVs held constant	Unique contribution
Unemployment	46,65 %	0,41 %
Lending rate	66,42 %	0,92 %
Disposable income	99,40 %	82,81 %

Fig. 5.21.

The change between without and with was then:

Change		
	Partial	Part
Unemployment	0,69 %	0,01 %
Lending rate	-0,49 %	0,00 %
Disposable income	0,00 %	4,61 %

Fig. 5.22.

Trøndelag

When the regression was run, above 67 was not statistically significant and was therefore excluded. Leaving the results to be:

Trøndelag		
	The other IVs held constant	Unique contribution
Unemployment	14,44 %	0,22 %
Disposable income	97,42 %	50,98 %
Lending rate	35,40 %	0,72 %

Fig. 5.23.

With LTV effect:

Trøndelag		
	The other IVs held constant	Unique contribution
Unemployment	14,59 %	0,21 %
Disposable income	97,61 %	49,28 %
Lending rate	38,19 %	0,76 %

Fig. 5.24.

The change between without and with was then:

Change		
	Partial	Part
Unemployment	-0,15 %	0,01 %
Disposable income	-0,20 %	1,70 %
Lending rate	-2,79 %	-0,03 %

Fig. 5.25.

West

When the regression was run, unemployment was not statistically significant and was therefore excluded. Leaving the results to be:

West		
	The other IVs held constant	Unique contribution
Disposable income	99,00 %	38,56 %
Lending rate	29,16 %	0,17 %
Above 67	58,98 %	0,59 %

Fig. 5.26.

With LTV effect:

West		
	The other IVs held constant	Unique contribution
Disposable income	98,80 %	32,26 %
Lending rate	24,30 %	0,13 %
Above 67	59,60 %	0,59 %

Fig. 5.27.

The change between without and with was then:

Change		
	Partial	Part
Disposable income	0,20 %	6,30 %
Lending rate	4,86 %	0,04 %
Above 67	-0,62 %	0,00 %

Fig. 5.28.

Oslo & Akershus

When the regression was run, unemployment was not statistically significant and was therefore excluded. Leaving the results to be:

Oslo & Akershus		
	The other IVs held constant	Unique contribution
Disposable income	99,00 %	66,42 %
Lending rate	11,22 %	0,08 %
Above 67	28,52 %	0,24 %

Fig. 5.29.

With LTV dummy:

Oslo & Akershus		
	The other IVs held constant	Unique contribution
Disposable income	98,80 %	56,85 %
Lending rate	10,76 %	0,09 %
Above 67	33,06 %	0,18 %

Fig. 5.30.

The change between without and with was then:

Change		
	Partial	Part
Disposable income	0,20 %	9,57 %
Lending rate	0,46 %	-0,01 %
Above 67	-4,55 %	0,06 %

Fig. 5.31.

North

When the regression was run, both above 67 and lending rate was not statistically significant and was therefore excluded. Leaving the results to be:

North		
	The other IVs held constant	Unique contribution
Disposable income	98,41 %	67,40 %
Unemployment rate	11,70 %	0,14 %

Fig. 5.32.

With LTV dummy effect:

North		
	The other IVs held constant	Unique contribution
Disposable income	98,41 %	62,73 %
Unemployment rate	11,76 %	0,14 %

Fig. 5.33.

The change between without and with was then:

Change		
	Partial	Part
Disposable income	0,00 %	4,68 %
Unemployment rate	-0,07 %	0,00 %

Fig. 5.34.

6. Discussion

This chapter aims at testing the hypothesis and by that answering the research question.

«Do demographic factors affect the relationship between a house price expansion and households´ debt? And should Loan- to- value (LTV) ratio adjustments be used as a stabilizer? »

1. An expansion in both house prices and households´ debt is a risk for financial stability.

    a. The LTV ratio has a positive effect in stabilizing an expansion in house prices and household debt.

It will be based on the results in the previous chapter, as well as the highlighted literature. The seven regions that have been under investigation will be presented as cases on different situations in an economy and how they behave with their unique characteristics. A discussion on bubble tendencies are presented on page x. Further, a table is displayed on page xx to highlight the combination of variables in each region and its corresponding LTV effect. Lastly, the discussion will highlight potential factors disturbing the financial stability in each region and hence for an economy in general.

5.4 Regional/Demographic findings

Situation 1: Hedmark & Oppland

This region had the lowest housing prices over the years, although it is moderately increasing. At the same time, the proportion of the population with a higher education of 4 years or more are the lowest of all regions as reflected in Figure 4.3. As highlighted in chapter 6, high education is highly correlated with disposable income and it is therefore not a surprise that the income level is low as well. The same is true for debt.

As the only region, both house prices and household debt is driven by the same factors; disposable income, lending rate and the population above 67 where disposable income has the greatest impact. With the LTV effect, either lending rate nor those above 67 is remarkably affected.

As seen from the regression results, the change between the before and after effect on LTV is 4,55% for disposable income. This indicate that when an LTV adjustment is implemented, a higher percentage of disposable income explain the fluctuation in the house prices. This indicate that households with low income will have more difficulties getting a mortgage loan, which in turn will reduce their ability to buy dwellings.

Situation 2: Agder og Rogaland.

As highlighted in the regional differences, this region has since 2014 been the victim of an oil crisis that shocked the economy where a lot of people lost their jobs hence the unemployment rate sky rocket. As was highlighted in chapter 3, a rapid increase in unemployment may reflect expectations of lower wages and hence increase peoples´ uncertainty of their ability to repay debt. This may be the reason behind the drop of housing demand, which have resulted in an overflow of supply of housing in the region.

We see a dramatic drop in the house prices and correspondingly an expansion in household debt, starting from 2013 and continues until the end of the analyzed period. It is further a situation with exceptionally large debt levels relative to income, but also a slightly positive increase in income levels. The explosion of unemployment and the fact that the numbers are averages, where a huge proportion of the overall population is left out of the wage statistics, may reflect that high-income earners kept their jobs which increased the average income of the region.

When looking at the regressions, the house prices are only reflected by disposable income and those above 67, where the latter was a low proportion of the population. As highlighted in the results, this region did not have statistically significant result for lending rate which may be due to the extreme shocks in the economy. As the other factors, such as unemployment rate and house prices is so volatile that it disturbs the effect of the other factors.

The household debt regression and its effect on an LTV adjustment, displays that the region has the largest effect on disposable income. With the LTV effect, the change in household debt can be

explained by disposable income alone of 6,45% more than without the effect. This corresponds to the finding above, that lending supply is reduced which will protect low income earners and the vulnerable in the economy. On the other hand, when looking at graph x and the LTVs´ potential to reduce house prices and/or households´ debt in the current circumstances it is shown that it does not have any direct effect in the analyzed period.

Situation 3: South East

This region is reflected by the highest unemployment rate relative to its population from the overall downturn after the financial crisis in 2008, and until the end of the analyzed period. It also has high and stable debt and income levels relative to the other regions and the second oldest population (percentage of the population above 67). As well as a low proportion with higher education.

Therefore, not surprisingly, the only region under investigation that had significant levels of unemployment that drives the house prices in the region. When lending rate, those above 67 and disposable income is held constant, unemployment rate accounts for 51% of the change in house prices. In theory, high unemployment lead to an expectation of lower wage growth and an increased uncertainty about the ability to repay debt in the future. The average high disposable income over time may indicate a twofold situation; where the people having a job has relatively high wages, whereas the high and stable unemployment rate and low higher education may indicate that the workforce supply is too low for meeting the qualifications of the population.

The high unemployment rate may also be a reason why South East is one out of two regions that has statistical significant results towards household characteristics to explain the house price levels. As highlighted in the results, the unique contribution towards the fluctuation in the house prices is 26,63% for couples without children, compared to a minimal percentage of only 6,35% for those living alone. The larger percentage for couples without kids, represents that they will automatically have better economic freedom compared to those living alone especially if both are unemployed.

Larsen, E. R. & Sommervoll, D. E., (2003) argued that a region with high unemployment will have lower demand for houses and hence high house prices. The region has high but gradually increasing house prices, but as the unemployment is relatively stable over time it can be assumed that the two-folded explanation of the region holds true.

Household debt in the region is a function of unemployment rate, lending rate and disposable income. The contribution of the two former is relatively stable both with and without an LTV adjustment (see chapter 5) whereas there is a higher percentage change in disposable income. The implication of an LTV effect shows that the fluctuations in household debt will raise the explanation power of disposable income with 4,61%. This indicate that a higher percentage of households´ disposable income must be spent on mortgage debts. Which in turn will make the two-folded situation described above, even more severe.

Situation 4: Oslo & Akershus

This displays the region with the highest house prices and with a remarkable expansion from 2014, both in house prices and households´ debt. In the same period, we also see increased levels of unemployment and a rapid increase of the proportion of higher educated people.

Due to the timeframe of these dramatic changes, a line can be drawn to the oil price collapse and hence the café latté effect described by Larsen, E. R., (2005) in chapter 2. Where people tend to move to bigger cities for a better work market. This may also be the reason behind some of the expansion in the education levels in the same period. We see a diminishing population growth in Agder and Rogaland, and a corresponding high population growth in Oslo and Akershus. At the same time, the unemployment rate has a dramatic raise in both regions starting from the fourth quarter of 2014. This may also indicate that the work marked in both regions are effected by the crisis, as these are the only two regions that have this trend.

Based on the regression output, the house prices for the region take a unique turn, and is together with region West, the only region that had difficulties with showing significant results for lending rate, when including more than just disposable income. Therefore, two separate regressions were performed for showing the fluctuation in house prices. One including disposable income and those above 67; here the unique contribution of disposable income was about 50%, whereas 4,28% for those above 67. When replacing the above 67 variables with lending rate we see a change in the explanatory power of disposable income, where it increases to close to 78%. This strengthen the assumption, as when only lending rate and disposable income is taken into consideration, the housing demand is reflected by peoples´ wealth. Further, that it is major differences within the region.

When looking at household debt, all variables could successfully be included in the regression (disposable income, lending rate and above 67), and as the other regions, disposable income accounts for most the fluctuation. As pointed out, it is also here signs of severe differences within the region, as an LTV effect has the highest change of all regions of close to a 10% difference of the before and after effect. Indicating an explanatory power of the unique contribution of disposable income by 66,42% with and 56,85% without. This indicate that the LTV in regions with extreme price increases do have a stabilizing effect even though it does not reduce the increase in either debt or house prices as of the analyzed period.

Together with South East, this is the only region where household characteristics had significant results on explaining the house prices. With couples without kids explaining close to 70% of the fluctuation in the house prices alone, whereas those living alone only account for close to 5%. Taken the situation in this region into consideration, this may indicate that in extreme expansion in house prices it is only 5% of single individuals that have the wealth to buy dwelling in this market.

Situation 5: Trøndelag

This region is characterized by low debt and income and where the proportion of the population above 67 is moderately increasing. The population growth is stable over the years under investigation, but when looking at the quarterly change we see a dramatic drop and fall with an annual increase every second quarter and a corresponding peak in the third quarter. This demonstrate the only region with specific signs driven by the fluctuation of students, where the peak is in the quarter of the semester start each year. As highlighted, Trøndelag has the 2nd highest population of people with higher education, therefore this assumption seems accurate. Similarly, Oslo & Akershus which also have a high educated population, have peaks in almost every second quarter, hence it cannot be assumed to be related to the semester start.

As the only region under investigation, it had significant level for housing start in the house price regression. Which accounted for approximately 35%, when the other variables (disposable income and lending rate) were held constant. This may be due to the extreme quarterly population growth, combined with a stable growth over time. Indicating a shortage of housing demand around the peak every year, then stabilize itself in the other periods.

Although, Oslo & Akershus also have a high population growth, this region is characterized by a rapidly expanding population over time which consequently will affect available land.

Another difference between the regions is that available land is limited in Oslo & Akershus compared to Trøndelag. As highlighted by Larsen, E. R. & Sommervoll, D. E., (2003) the price formation in larger regions are more complex, typically due to area shortages. This can be seen to be the reason why Trøndelag is the only region where housing start showed statistically significant levels in the regression. Housing start is therefore a good explanation of the house price in Trøndelag due to expansion of students arriving in specific periods of the year. As the overall population is stable it indicates that the pressure on housing demand and the house prices can be reduced by building student accommodations. As the overall population is relatively stable over the years, it indicates that people move out of the region after finishing their degrees.

Situation 6: North

The region is characterized with the following demographic factors; high expanding house prices, high debt levels as well as high disposable income. Furthermore, a relatively low proportion of higher education and a high population above 67.

When running the house price regression, as highlighted in the last chapter, it was found that this region is the only region that does not correspond to the banks' lending rate. The statistically significant level was not valid for any combination of the variables. An explanation of this can be drawn from the description about this region, where parts of the region have tax deduction benefits, which probably reflects the results. Therefore, it can be assumed that the benefits outperform the lending rates effect on the wealth of the economy. This is true for both the fluctuation of house prices and the household debt. Where the house prices, as noted, is only explained by population growth and disposable income, whereas the debt is a function of disposable income and unemployment.

The region is affected by the LTV implementation to some extent, with a unique effect on disposable income as an explanatory variable of household debt of 4,68% higher when LTV is implemented.

Situation 7: West

The house prices here take a unique turn. It is increasing until the end of 2015, then it is slightly stabilizing and stays at the same level all through 2016. The region is further characterized by a moderately stable population above 67 and a high and slightly rising higher education. Furthermore, a high level of household debt and disposable income.

This is the only region where the house prices seem to stabilize after the implementation of the LTV regulation in 2015. Where the house prices can be explained by two separate regression equations; one including disposable income and lending rate, where each unique contribution is 84,3% for disposable income and only 1% for lending rate. When replacing lending rate with those above 67, the disposable incomes´ unique contribution decrease to approximately 38%. Which may indicate the same specifications as explained for the Oslo & Akershus region.

Unemployment rate is relatively stable until the fourth quarter of 2014 when it starts raising and peaks the following year (2015 Q4), then seems to stabilize at a new level. Although the household debt equation is a function of disposable income, lending rate and those above 67, it is only disposable income that displays remarkably results following a LTV adjustment. The before and after effect shows a change of 6,30%, indicating that with the implementation, the debt is explained by a higher amount of disposable income than without.

It was not until the regulation was implemented by law in 2015 that we saw a change, leaving this region to have the combined factors that does respond to an LTV implementation and hence work as a stabilizer of the house prices.

5.5 Does any of the regions have bubble characteristics?

As highlighted in previous studies in chapter 2 a housing bubble can threat an economies financial stability and it is therefore useful to analyze whether a certain economy have bubble tendencies. Furthermore, as varies empirical evidence has shown, a detected national wide bubble has happened to be a combination of one or more regional bubbles instead. Therefore, as the regions under investigation have major differences in terms of how they behave and fluctuate, a national wide bubble cannot be concluded. On the other hand, two of the regions show signs of rapid price

increase or decrease which may be related to bubble tendencies and will therefore be further discussed;

In terms of financial stability, we see the most extreme house price volatility in Agder & Rogaland and Oslo & Akershus, with somewhat opposite behaviors and tendencies of a spillover effect. It can be argued that both regions have characteristics of a bubble behavior as seen in graph x and x. Where Oslo & Akershus has a rapid price increase, whereas a sharp reduction is seen in Agder & Rogaland. At the same time, the rapid price increase in Oslo & Akershus starts a few quarters after the drop in prices in Agder & Rogaland. As highlighted above, the two regions´ behavior show signs of spillover effects where the population growth in Agder & Rogaland decreased whereas Oslo & Akershus hold a continues high growth which in turn may affect the demand of housing in Oslo & Akershus.

According to Minsky´s five phases, as described in chapter 2, an economy with bubble tendencies typically have different characteristics in each phase of the cycle. In Oslo & Akershus, the region has moved from a phase of euphoria, where the market participants question whether there exists a bubble or not. Towards a profit taking phase, where government interventions are put in place to try to weaken the price increase. This is exactly what was done with the implementation of the LTV. But when it is still demand in the market, the investors will continue to invest in property as long as they believe in a positive return.

On the other hand, Agder & Rogaland can be classified as currently being in a panic phase which is a result of an economic downturn. As seen in graph x and x, the region has been following the same path as in Agder & Rogaland, in terms of a rapid price increase with corresponding large debt levels. Individuals sell their homes at a rapid rate to try to avoid losing money. As seen here, the price fall can be explained by a reduction in demand due to the uncertainty of the future.

Furthermore, it is highlighted by Kindleberger, C., & Aliber, R.Z., (2005) that Minsky's view can be somewhat static and less relevant today due to better monitoring of financial instability which is explained din chapter 4 about the credit market. But as a parallel can be drawn between his phases and the similar patterns of the regions, it may be a concern of whether the tools in place are sufficient enough for the stability, at least in situation Agder & Rogaland and Oslo & Akershus. Therefore, it can be indicated that there are bubble tendencies in both regions. With Oslo &

Akershus being in a bubble, whereas situation Agder & Rogaland has moved beyond this phase and are currently on its way to a bust of the economy.

However, a different view is given by Lind, H., (2009), where he argues that if the dramatic price increase has lasted for more than 1-2 years, the expansion is not related to a bubble but rather two separate events. When looking at the development of the prices in Oslo & Akershus, the rapid price increase has been going on since the fourth quarter of 2015. Therefore, based on this view it may not be a bubble situation and rather a spillover effect of the oil price crisis. This display a situation where an economic shock in one region affect the development in another negatively. Furthermore, as pointed out by the analysis, the LTV restriction do reduce credit supply, which will help for the financial stability.

5.6 How did the LTV work?

As earlier studies have stressed, the objective of implementing LTV limits is to decrease credit growth and prevent a housing boom. As noted in chapter 2, Jácome, L. I. & Mitra, S., (2015) found that a tightening corresponds to a decline in house prices, whereas Duca, J. V., et. al., (2011) found that LTV limits lowered the mortgage credit and house prices. None of the regions under investigation had a reduced house price effect following a tightening, but it is shown that the tightening reduces credit supply, which in the long run will a further increase. In relation to financial stability, this is good sign as it will exclude parts of the population from receiving loans. If for instance the lending rate would raise, the lower income earners would struggle more to repay their debt as their buying power would be reduced. This would in turn affect the economy, as a reduction in households buying power will reduce consumption of other goods. Previous studies have found that there is a time lag of about a year from house prices starts declining and until a correlated effect is seen on the debt level (Jacobsen, D. H., & Naug, B. E., 2004), (Amundsen, . k., & Jansen, E. S., 2011).

The weight of disposable income as a proxy to explain the fluctuations in household debt is greater when LTV is implemented versus when the effect is held constant with a dummy. This reflect that the higher an individuals' disposable income, the greater the chance to receive a mortgage loan. This will in turn lead to less risk and hence greater financial stability. The risk is associated with the ability to repay debt, and hence individuals that are more volatile to economic disturbance will have

greater difficulties receiving a mortgage loan. This can be related to the situation in Agder and Rogaland, where a negative shock to the economy were followed by an expansion in household debt. The extreme increase in the unemployment rate made people sell their homes with a loss, as housing demand dropped because of the uncertainty of the economy. As dwellings, often are financed with credit, selling with a loss will raise the proportion of debt. Furthermore, stricter lending rules may force households without enough capital out of the market (Larsen, E. R. & Sommervoll, D. E., 2003). An overview of the different combination of the factors in each region and the corresponding effect from the LTV is showed below;

	Higher Education	Unemployment	Households debt	Above 67	Disposable Income	LTV Effect
1 Hedmar&Oppland	low	low	low	high	low	Effect on DI to debt
2 Agder & Rogaland	moderate increase	moderate to high	high	low	high	Effect on DI to debt
3 South East	low	high	high	high	high	Effect on DI to debt
4 Oslo&Akershus	high	relative low	medium	low	moderate	Effect on DI to debt
5 Trøndelag	high	low	low	moderate	low	Close to zero (indifferent)
6 north	low	stable	high	relativey high	medium	Effect on DI to debt
7 west	moderate increase	Relatively stable, then increase the two last years	high	stable	high	Effect on DI to debt. Successful modification of house prices after regulation was implemented

Fig. 6.1.

With the first implementation of the tool in 2010 and the further tightened in the following year, no effect was seen in any of the regions in terms of a reduction in house prices and households´ debt. It was rather the opposite picture that was seen, as displayed in graph x. It was not until the regulation was implemented by law in 2015 that a direct reaction was seen in one of the regions in terms diminishing house prices. As highlighted in the table above, West was the only region with a direct effect on the house prices. The LTV regulation and further tightening was implemented by law in June 2015 and a corresponding level out was seen from the first quarter of 2016. This indicate that with the highlighted levels of the variables in place, the effect has a time lag of about a year until we see a reaction. The percentage change of the relationship between house prices, households´ debt and disposable income for region West is shown below, here we see similar characteristics as was found by McDonald, C., (2015); that a tightening has greater effect when house prices is high relative to income. This was true from the period before the 2015 implementation and until the end of the analyzed period.

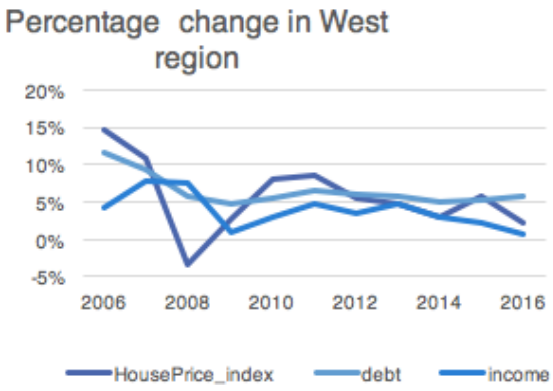


Fig. 6.1.

It was further found that the regions with the highest house price growth (and debt) has either a high educated population and/or high income earners. As both higher education and disposable income are highly positively correlated, any combination of the variables indicate the same results.

McDonald, C., (2015) stated that house prices tend to fall following a tightening and that the decline is greater when it corresponds to high credit growth. This is to some extend true for this analysis. Greater credit growth does seem to correspond better to LTV tightening in terms of the disposable income effect. That a greater proportion of disposable income explains the proportion of debt which in turn corresponds to tighter supply of credit, which is good for preventing instability in the market. On the other side, it is not found that it leads to a fall in house prices.

It was further found that house prices in all regions were mostly explained by disposable income. Whereas, in regions were house prices were more volatile, other factors had more to say. The opposite was found by Case, K. E., & Shiller, R. J. (2003). The authors further found that raising house prices had a negative effect on employment, as people would move away from these regions for better work opportunities. This correlation was only found in Agder & Rogaland where the economy experienced an economic shock. Furthermore, the regions with high population growth are also the once with both high house prices and household debt. Larsen, E. R. & Sommervoll, D. E., (2003) had the same findings, where they state that a large population reflects higher housing demand and hence the price will increase. However, the different results may also be related to the fact that the authors results were conducted before the global financial crisis which may reflect an economy that is driven by other fluctuation patterns.

7. Conclusion

Throughout the last decades, Norway has had a simultaneous expansion in housing prices and household debt. This combination of factors is a threat to any economy's financial stability.

The purpose of this thesis was henceforth to identify different economic and demographic characteristics that cause the fluctuations in any of the two variables. Norway was used as a case study, and was divided into seven different regions for comparative purposes.

Further to the expansion in housing prices and household debt, there has been an increasing trend of using macro-prudential policies as a stabilizing device to prevent financial instability, where the Loan- to – Value (LTV) ration is one major tool.

Norway first implemented LTV restrictions in 2010, a further tightening was done the following year and was thereafter regulated by law in 2015. The thesis therefore aimed to analyze the effect these adjustments have had, and further whether some demographic and fundamental factors was a better fit. The overall aim was to identify whether an LTV could be used as a stabilizing tool to prevent financial instability.

An implementation of a LTV ratio aims to reduce an individual's ability to receive mortgage loans, and will thereby have a direct effect on debt levels. Additionally, as real estate is largely credit financed, stricter lending rules will have an indirect effect on prices. This thesis has showed that recent studies have detected indications of an LTVs ability to decrease both house prices and credit growth. However, it should be emphasized, that there is an overall lack of empirical evidence supporting the effect. Current research has primarily been conducted on emerging economies, which could lead to an imbalanced illustration of the actual situation. Additionally, it should be stressed, that there is a further lack of evidence supporting the effect on advanced economies, such as Norway. This should be taken into consideration when looking at the results.

The thesis analyzed quarterly data, ranging from the first quarter of 2005 until the fourth quarter of 2016. Seven regions were analyzed, and their unique features were compared to make a framework for a combination that best responds to the LTV implementation in advanced economies.

Three different scenarios were as follows:

Scenario 1

A close to zero effect was found in Trøndelag, where household debt levels were relatively low. This was despite the fact that real estate prices in the region had one of the sharpest increases compared to the other regions. It therefore seems that in a region where housing prices are driven by student demand, and with the following characteristics, the market does not respond well to a tightening of an LTV ratio.

- Higher education: high
- Unemployment: low
- Households debt: low
- Above 67: moderately increasing
- Disposable income: low

Although debt levels are relatively low, and an LTV effected debt levels directly, this finding corresponds to previous research. For this scenario, it can therefore be concluded that implementing an LTV tool does not work if there is a low risk of financial instability.

Scenario 2

This situation is found in the west region, where housing prices are increasing, although not as rapidly as compared to Oslo & Akershus and the North region. In the two latter regions, there was detected an even sharper increase. It is notable, however, that when looking at the comparison between disposable income and debt levels, we can see an expanding gap caused by declining income levels throughout the period, whereas debt levels has a steady increase.

As emphasized by the regression results, the LTV effect has a positive outcome. This is principally due to the fact that household debt can be explained by a higher proportion of disposable income when LTV is inserted. As highlighted, this means that availability of credit is reduced, which in turn will support financial stability.

Furthermore, this scenario also reflects the only region where a direct effect on house prices is found. It was not until the LTV was formalized by law in 2015 that a direct effect was seen on the housing prices, it this is a strong indication that strict lending rules needs to be in place in order to achieve a balanced housing market.

Henceforth it can be concluded that an LTV ratio of 85% corresponds successfully, and will have a direct effect on reducing the housing prices in an advanced economy conditioned upon the following characteristics:

- Higher education: moderately increase
- Unemployment: relatively stable, then increase the last two years
- Households debt: high
- Above 67: stable
- Disposable income: high

Scenario 3

The other combinations of factors did impact financial stability through the disposable income effect that was explained above. It was found that an LTV adjustment had greater effect when both household debt and disposable income was high.

As earlier studies on the LTV effect on housing prices and household debt has been done on emerging countries, it can be concluded that advanced economies respond somewhat different, in that it is only under certain conditions that a direct effect was seen. This was correspondingly illustrated in scenario 2. However, in all scenarios but one, the LTV effect stipulated better financial stability through the disposable income effect. The different results may lie in the fact that advanced economies have better regulations in place for monitoring and controlling instability, contrary to many emerging economies.

Additionally, it should be noted, that a combination of both high prices for housing and an expansion in debt must be in place for LTV to be efficient. Furthermore, a time lag of about one year should be expected, ranging from the implementation of the tightening, until a response was detected. This is true for economies with the specific combination of factors including high housing prices and expansion of debt.

Further research

While an LTV ratio tightening did display evidence in stabilizing financial stability through the disposable income effect, the higher explanatory power of disposable income may also suggest larger differences between high income earners and the average population. This could therefore be a point for further research by including independent variables such as heritage or tax income, instead of disposable income to analyze what impact this may have. Moreover, there are still a need for additional empirical evidence on the topic concerning advanced economies. With the new implementation in 2017 including regional specific directions, further studies could expand the timeframe used in this thesis to further analyze this effect on advanced economies.

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Data collection

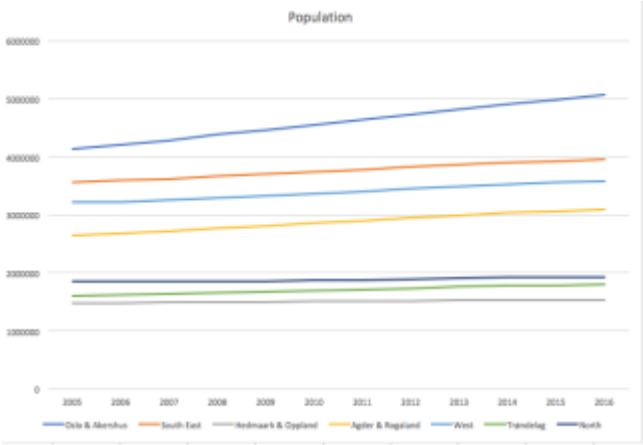
Statistics Norway: www.ssb.no

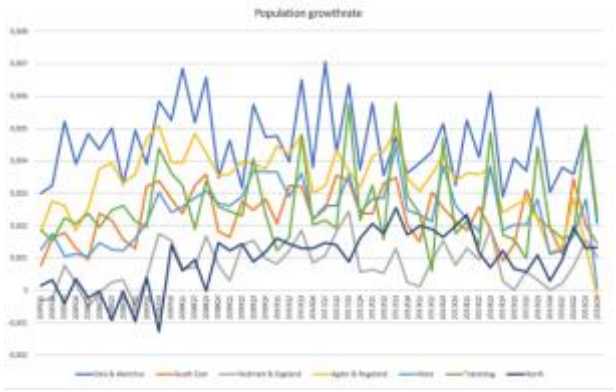
Norwegian Labour and Welfare Administration (NAV): https://www.nav.no/no/NAV+og+samfunn/Statistikk/Arbeidssokere+og+stillinger+-+statistikk/Helt+ledige

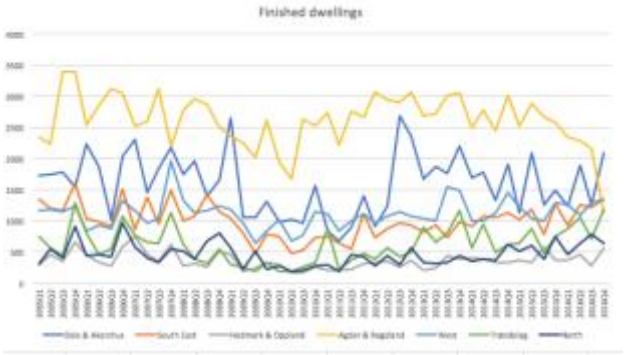
Appendix

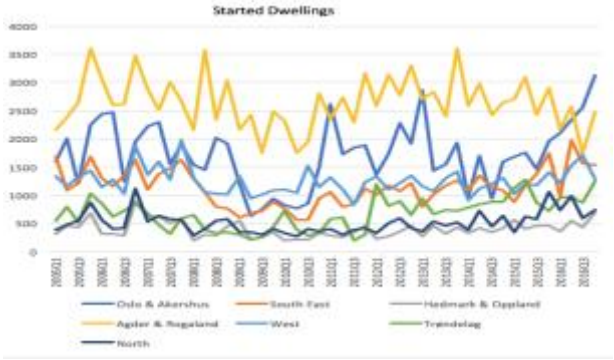
Table of Content

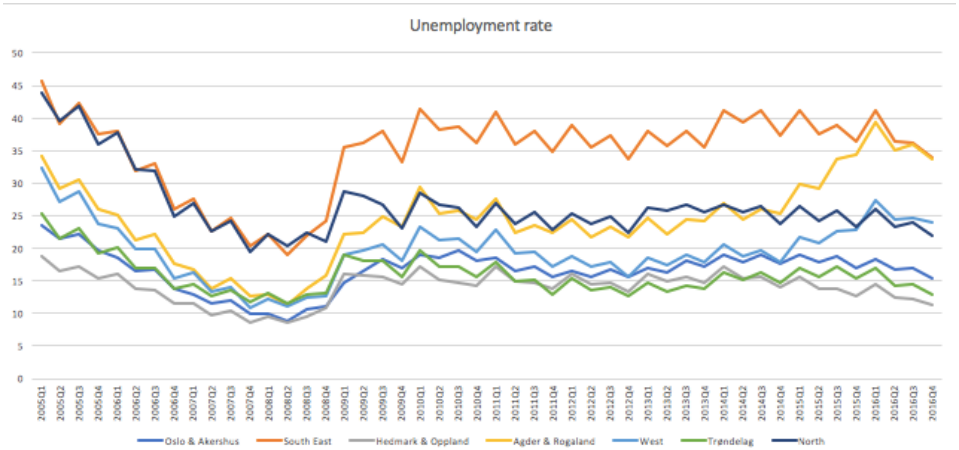
Appendix 1: Regional Statistics

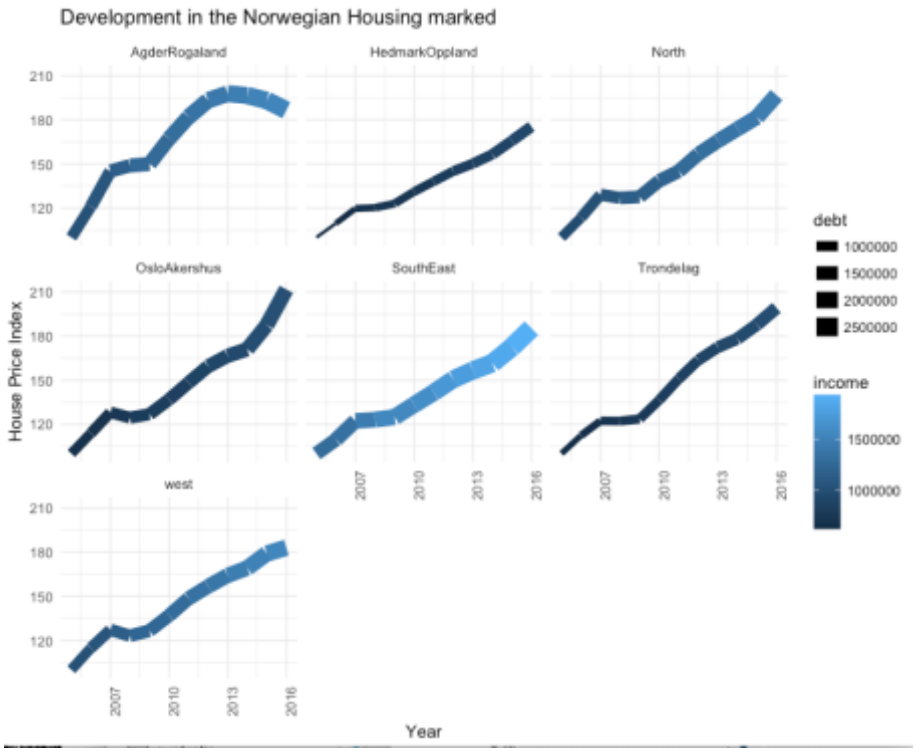








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HedmarkOppland
North
OsloAkershus
SouthEast
Trondelag
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2000000
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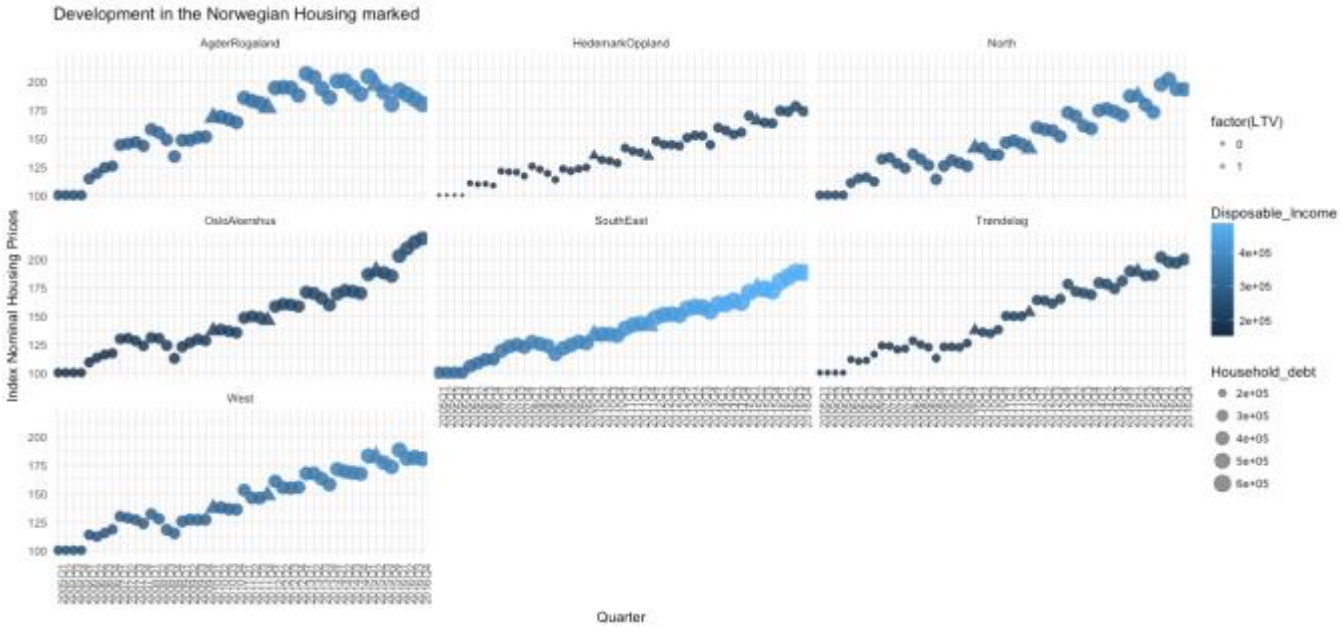
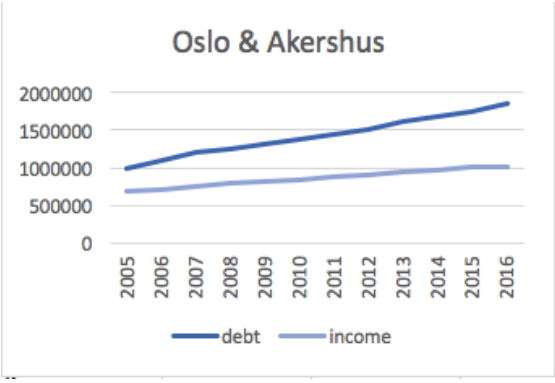
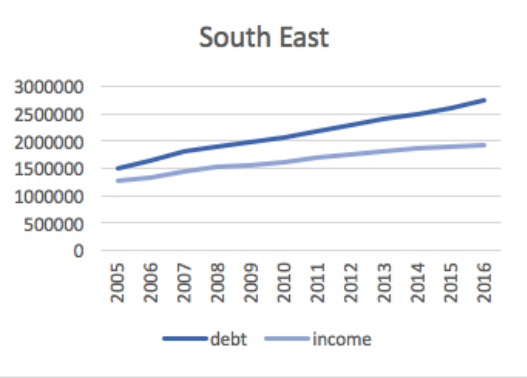
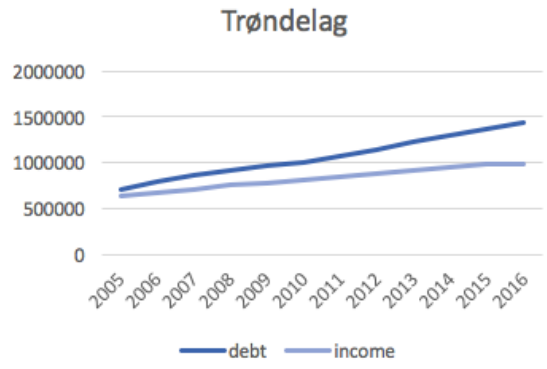
1500000
1000000

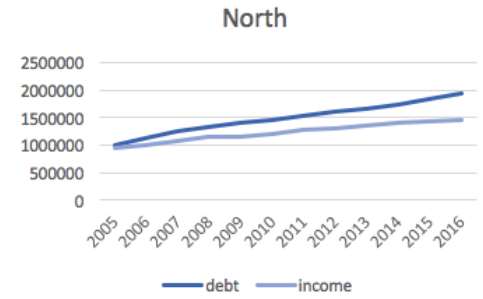

Development in the Norwegian Housing marked
AgderRogaland
HedmarkOppland
North
OsloAkershus
SouthEast
Trondelag
West
Index Nominal Housing Prices
Quarter
factor(LTV)
Disposable_Income
Household_debt

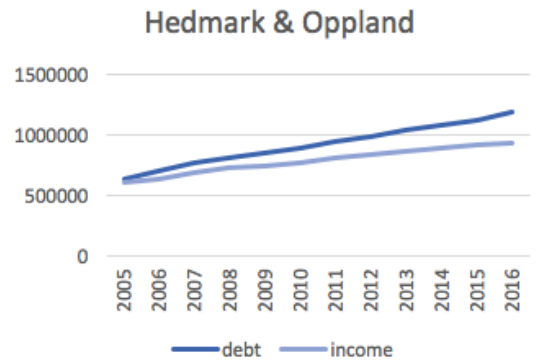
Appendix 2: The relationship between disposable income and household debt

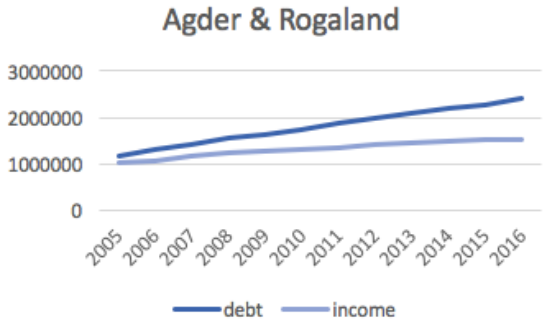


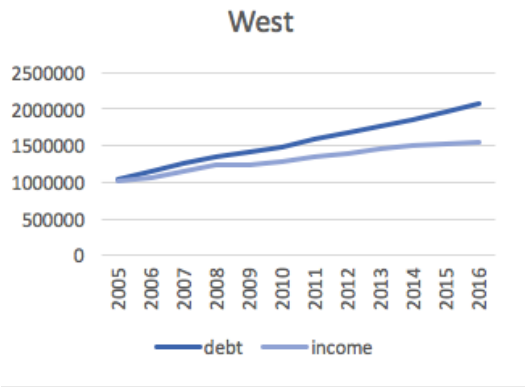




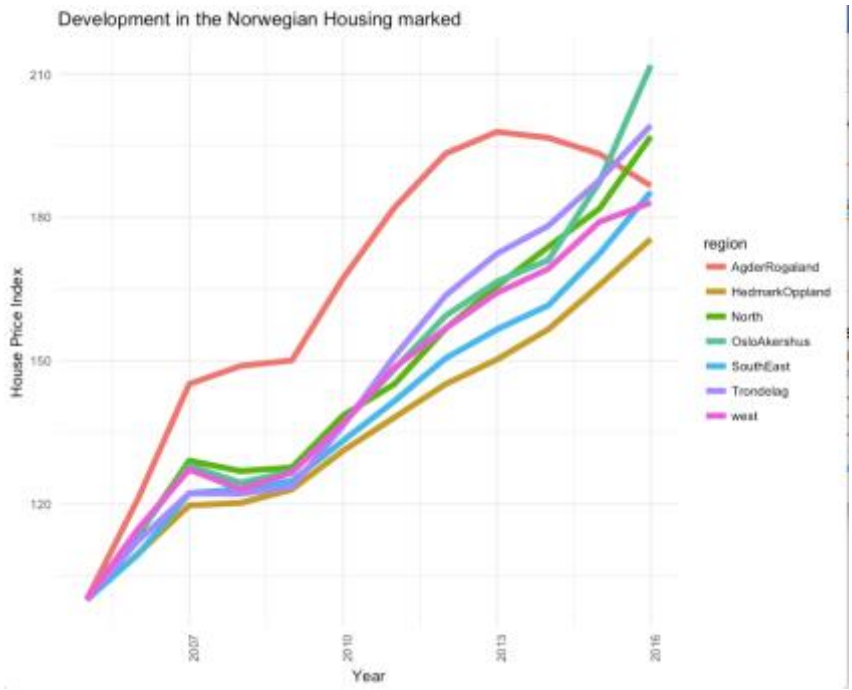








Appendix 3: Interest rate vs house prices



Appendix 4: Data Formatting

Agder & Rogaland

year	housing start	finished dwellings	Household debt	Disposable Income	Lending rate	HousePrice index	UnemploymentRate	PopGrowth rate	HigherEducation	Above 67	Households single	Households couple w/o kids	Households couple w kids
2005Q1	2161	2335	287425	255750	3,92	100	34,2	0,00186	0,0022	0,0069596	23536,5	14307,75	17641,75
2005Q2	2384	2228	287425	255750	3,92	100	29,2	0,00276	0,0022	0,0069596	23536,5	14307,75	17641,75
2005Q3	2635	3393	287425	255750	3,92	100	30,5	0,00262	0,0022	0,0069596	23536,5	14307,75	17641,75
2005Q4	3602	3397	287425	255750	3,92	100	26,1	0,00187	0,0022	0,0069596	23536,5	14307,75	17641,75
2006Q1	3067	2542	323475	267500	4,26	114	25,2	0,00255	0,0023	0,0069178	24065,5	14706,75	17766
2006Q2	2601	2850	323475	267500	4,26	119	21,2	0,00375	0,0023	0,0069178	24065,5	14706,75	17766
2006Q3	2617	3129	323475	267500	4,26	124	22,1	0,00393	0,0023	0,0069178	24065,5	14706,75	17766
2006Q4	3463	3052	323475	267500	4,26	126	17,7	0,00330	0,0023	0,0069178	24065,5	14706,75	17766
2007Q1	2878	2532	357200	290500	5,66	144	16,7	0,00358	0,0025	0,0068978	24763,75	15024,25	17915,5
2007Q2	2512	2601	357200	290500	5,66	146	13,9	0,00470	0,0025	0,0068978	24763,75	15024,25	17915,5
2007Q3	3003	3124	357200	290500	5,66	147	15,4	0,00508	0,0025	0,0068978	24763,75	15024,25	17915,5
2007Q4	2670	2200	357200	290500	5,66	144	12,6	0,00397	0,0025	0,0068978	24763,75	15024,25	17915,5
2008Q1	2153	2774	389000	312000	7,29	158	13	0,00393	0,0026	0,0068442	25760,25	15454	18171,75
2008Q2	3577	2954	389000	312000	7,29	155	11,2	0,00482	0,0026	0,0068442	25760,25	15454	18171,75
2008Q3	2338	2862	389000	312000	7,29	149	13,7	0,00425	0,0026	0,0068442	25760,25	15454	18171,75
2008Q4	3039	2511	389000	312000	7,29	134	15,8	0,00355	0,0026	0,0068442	25760,25	15454	18171,75
2009Q1	2154	2359	408625	315500	4,91	148	22,1	0,00359	0,0027	0,0067836	26711	15694,75	18339
2009Q2	2427	2258	408625	315500	4,91	149	22,3	0,00398	0,0027	0,0067836	26711	15694,75	18339
2009Q3	1746	2015	408625	315500	4,91	151	24,8	0,00390	0,0027	0,0067836	26711	15694,75	18339
2009Q4	2480	2611	408625	315500	4,91	152	23,4	0,00375	0,0027	0,0067836	26711	15694,75	18339
2010Q1	2314	1943	435450	323750	4,52	169	29,4	0,00447	0,0029	0,0068116	27249,5	15993	18486,75
2010Q2	1751	1667	435450	323750	4,52	169	25,3	0,00422	0,0029	0,0068116	27249,5	15993	18486,75
2010Q3	1941	2634	435450	323750	4,52	167	25,8	0,00480	0,0029	0,0068116	27249,5	15993	18486,75
2010Q4	2806	2517	435450	323750	4,52	164	24,5	0,00299	0,0029	0,0068116	27249,5	15993	18486,75
2011Q1	2354	2744	466800	339000	4,75	186	27,5	0,00322	0,0031	0,006893	27854,75	16267,25	18694,25
2011Q2	2721	2210	466800	339000	4,75	183	22,4	0,00432	0,0031	0,006893	27854,75	16267,25	18694,25
2011Q3	2288	2754	466800	339000	4,75	181	23,6	0,00369	0,0031	0,006893	27854,75	16267,25	18694,25
2011Q4	3167	2673	466800	339000	4,75	177	22,4	0,00316	0,0031	0,006893	27854,75	16267,25	18694,25
2012Q1	2587	3064	497500	351000	4,84	195	24,4	0,00415	0,0032	0,0069751	28008,5	16671,75	18894,75
2012Q2	3132	2939	497500	351000	4,84	195	21,8	0,00427	0,0032	0,0069751	28008,5	16671,75	18894,75
2012Q3	2771	2911	497500	351000	4,84	195	23,3	0,00498	0,0032	0,0069751	28008,5	16671,75	18894,75
2012Q4	3295	3073	497500	351000	4,84	188	21,8	0,00344	0,0032	0,0069751	28008,5	16671,75	18894,75
2013Q1	2697	2688	524025	365500	4,75	207	24,7	0,00306	0,0033	0,0070782	28738,75	17064,75	19096,5
2013Q2	2832	2718	524025	365500	4,75	204	22,1	0,00357	0,0033	0,0070782	28738,75	17064,75	19096,5
2013Q3	2395	3020	524025	365500	4,75	194	24,5	0,00419	0,0033	0,0070782	28738,75	17064,75	19096,5
2013Q4	3598	3043	524025	365500	4,75	186	24,2	0,00336	0,0033	0,0070782	28738,75	17064,75	19096,5
2014Q1	2575	2495	545950	375500	4,61	201	27	0,00362	0,0038	0,0071822	27805,75	18893,5	19321,75
2014Q2	2977	2771	545950	375500	4,61	201	24,4	0,00357	0,0038	0,0071822	27805,75	18893,5	19321,75
2014Q3	2419	2460	545950	375500	4,61	195	26,1	0,00377	0,0038	0,0071822	27805,75	18893,5	19321,75
2014Q4	2641	3004	545950	375500	4,61	189	25,4	0,00241	0,0038	0,0071822	27805,75	18893,5	19321,75
2015Q1	2703	2529	566425	381500	3,93	205	29,9	0,00261	0,0041	0,0074128	28384,25	19256,25	19380,25
2015Q2	3088	2890	566425	381500	3,93	197	29,2	0,00281	0,0041	0,0074128	28384,25	19256,25	19380,25
2015Q3	2429	2663	566425	381500	3,93	191	33,7	0,00221	0,0041	0,0074128	28384,25	19256,25	19380,25
2015Q4	2903	2572	566425	381500	3,93	180	34,4	0,00115	0,0041	0,0074128	28384,25	19256,25	19380,25
2016Q1	2160	2344	598558,726	381144,75	3,51	192	39,4	0,00135	0,0041	0,0076333	29075,25	19721,5	19489,25
2016Q2	2567	2287	598558,726	381144,75	3,51	189	35,1	0,00286	0,0041	0,0076333	29075,25	19721,5	19489,25
2016Q3	1745	2166	598558,726	381144,75	3,51	185	36	0,00138	0,0041	0,0076333	29075,25	19721,5	19489,25
2016Q4	2471	1125	598558,726	381144,75	3,51	180	33,7	-0,00020	0,0041	0,0076333	29075,25	19721,5	19489,25

Hedmark & Oppland													
year	housing start	finished dwellings	Household debt	Disposable Income	Lending rate	HousePrice index	UnemploymentRate	PopGrowth rate	HigherEducation	Above 67	Households single	Households couple w/o kids	Households couple w kids
2005Q1	312	291	160225	152750	3,92	100	18,8	-0,00029	0,0016	0,009609	14877,75	9641,75	8672
2005Q2	459	458	160225	152750	3,92	100	16,6	-0,00026	0,0016	0,009609	14877,75	9641,75	8672
2005Q3	430	358	160225	152750	3,92	100	17,2	0,00076	0,0016	0,009609	14877,75	9641,75	8672
2005Q4	679	657	160225	152750	3,92	100	15,4	0,00023	0,0016	0,009609	14877,75	9641,75	8672
2006Q1	315	455	175525	159000	4,26	110	16,1	-0,00050	0,0016	0,009601	15130,75	9721,25	8624,25
2006Q2	306	326	175525	159000	4,26	110	13,7	-0,00005	0,0016	0,009601	15130,75	9721,25	8624,25
2006Q3	282	276	175525	159000	4,26	110	13,5	0,00026	0,0016	0,009601	15130,75	9721,25	8624,25
2006Q4	897	591	175525	159000	4,26	108	11,5	0,00032	0,0016	0,009601	15130,75	9721,25	8624,25
2007Q1	620	749	190875	171500	5,66	121	11,5	-0,00048	0,0017	0,009572	15235,75	9799,5	8542,75
2007Q2	612	468	190875	171500	5,66	121	9,8	0,00044	0,0017	0,009572	15235,75	9799,5	8542,75
2007Q3	499	357	190875	171500	5,66	120	10,3	0,00173	0,0017	0,009572	15235,75	9799,5	8542,75
2007Q4	593	616	190875	171500	5,66	117	8,7	0,00153	0,0017	0,009572	15235,75	9799,5	8542,75
2008Q1	195	271	201825	184000	7,29	125	9,6	0,00065	0,0018	0,011427	15516	9968	8498
2008Q2	301	310	201825	184000	7,29	123	8,5	0,00072	0,0018	0,011427	15516	9968	8498
2008Q3	289	260	201825	184000	7,29	119	9,5	0,00169	0,0018	0,011427	15516	9968	8498
2008Q4	445	513	201825	184000	7,29	114	10,8	0,00078	0,0018	0,011427	15516	9968	8498
2009Q1	544	458	211775	186250	4,91	123	16	0,00028	0,0019	0,009515	15745,5	10001,5	8430,25
2009Q2	212	195	211775	186250	4,91	121	15,8	0,00139	0,0019	0,009515	15745,5	10001,5	8430,25
2009Q3	250	239	211775	186250	4,91	123	15,7	0,00153	0,0019	0,009515	15745,5	10001,5	8430,25
2009Q4	338	335	211775	186250	4,91	124	14,4	0,00098	0,0019	0,009515	15745,5	10001,5	8430,25
2010Q1	201	304	223200	192500	4,52	135	17,3	0,00080	0,0019	0,009571	16023,75	10010,75	8354,5
2010Q2	206	173	223200	192500	4,52	131	15,1	0,00124	0,0019	0,009571	16023,75	10010,75	8354,5
2010Q3	213	167	223200	192500	4,52	130	14,8	0,00185	0,0019	0,009571	16023,75	10010,75	8354,5
2010Q4	334	259	223200	192500	4,52	128	14,2	0,00085	0,0019	0,009571	16023,75	10010,75	8354,5
2011Q1	282	215	235200	202500	4,75	142	17,1	0,00108	0,0020	0,009701	16375,5	10060,25	8253
2011Q2	253	203	235200	202500	4,75	139	14,9	0,00183	0,0020	0,009701	16375,5	10060,25	8253
2011Q3	342	225	235200	202500	4,75	138	14,8	0,00243	0,0020	0,009701	16375,5	10060,25	8253
2011Q4	452	321	235200	202500	4,75	134	13,7	0,00055	0,0020	0,009701	16375,5	10060,25	8253
2012Q1	226	339	247675	208250	4,84	148	16	0,00063	0,0021	0,009861	16585,25	10213	8240,5
2012Q2	273	349	247675	208250	4,84	145	14,4	0,00054	0,0021	0,009861	16585,25	10213	8240,5
2012Q3	354	253	247675	208250	4,84	144	14,7	0,00128	0,0021	0,009861	16585,25	10213	8240,5
2012Q4	454	366	247675	208250	4,84	144	13,4	0,00026	0,0021	0,009861	16585,25	10213	8240,5
2013Q1	264	203	258800	216500	4,75	151	16	0,00013	0,0022	0,010045	16770	10332	8215,5
2013Q2	461	245	258800	216500	4,75	153	15	0,00091	0,0022	0,010045	16770	10332	8215,5
2013Q3	320	441	258800	216500	4,75	152	15,6	0,00154	0,0022	0,010045	16770	10332	8215,5
2013Q4	434	390	258800	216500	4,75	144	14,7	0,00077	0,0022	0,010045	16770	10332	8215,5
2014Q1	329	401	269100	223000	4,61	160	17,3	0,00129	0,0024	0,010242	16576,75	11361,25	8197,75
2014Q2	412	391	269100	223000	4,61	157	15,4	0,00096	0,0024	0,010242	16576,75	11361,25	8197,75
2014Q3	347	339	269100	223000	4,61	154	15,6	0,00193	0,0024	0,010242	16576,75	11361,25	8197,75
2014Q4	419	328	269100	223000	4,61	156	14	0,00028	0,0024	0,010242	16576,75	11361,25	8197,75
2015Q1	566	364	281750	229250	3,93	170	15,6	0,00002	0,0025	0,010564	16753,5	11510,25	8173,75
2015Q2	397	327	281750	229250	3,93	166	13,7	0,00056	0,0025	0,010564	16753,5	11510,25	8173,75
2015Q3	465	586	281750	229250	3,93	164	13,8	0,00033	0,0025	0,010564	16753,5	11510,25	8173,75
2015Q4	455	375	281750	229250	3,93	163	12,6	0,00000	0,0025	0,010564	16753,5	11510,25	8173,75
2016Q1	359	373	297733,8942	231810,5	3,51	175	14,5	0,00021	0,0027	0,010861	17083,5	11689,25	8107,75
2016Q2	547	460	297733,8942	231810,5	3,51	174	12,4	0,00074	0,0027	0,010861	17083,5	11689,25	8107,75
2016Q3	430	285	297733,8942	231810,5	3,51	178	12,2	0,00153	0,0027	0,010861	17083,5	11689,25	8107,75
2016Q4	688	565	297733,8942	231810,5	3,51	174	11,3	0,00106	0,0027	0,010861	17083,5	11689,25	8107,75

							North							
year	housing_start	finished_dwellings	Household_debt	Disposable_Income	Lending_rate	HousePrice_index	UnemploymentRate	PopGrowth_rate	HigherEducation	Above_67	Households_single	Households_couple_w/o_kids	Households_couple_w_kids	
2005Q1	380	316	250150	240000	3,92	100	43,9	0,0001665	0,00184	0,00786618	18663,5	9805	11207,5	
2005Q2	466	556	250150	240000	3,92	100	39,5	0,0003350	0,00184	0,00786618	18663,5	9805	11207,5	
2005Q3	548	410	250150	240000	3,92	100	41,8	-0,0004105	0,00184	0,00786618	18663,5	9805	11207,5	
2005Q4	864	914	250150	240000	3,92	100	36	0,0003415	0,00184	0,00786618	18663,5	9805	11207,5	
2006Q1	553	444	279050	250500	4,26	111	37,8	-0,0002204	0,00193	0,00793808	18808,75	9981	11112,25	
2006Q2	406	452	279050	250500	4,26	115	32,1	-0,0000303	0,00193	0,00793808	18808,75	9981	11112,25	
2006Q3	421	419	279050	250500	4,26	116	31,9	-0,0009121	0,00193	0,00793808	18808,75	9981	11112,25	
2006Q4	1113	961	279050	250500	4,26	112	24,9	-0,0000087	0,00193	0,00793808	18808,75	9981	11112,25	
2007Q1	533	588	313025	268000	5,66	132	26,9	-0,0009454	0,00204	0,0080077	18956,5	10125,25	11005,5	
2007Q2	627	403	313025	268000	5,66	133	22,6	0,0004006	0,00204	0,0080077	18956,5	10125,25	11005,5	
2007Q3	577	328	313025	268000	5,66	128	24,3	-0,0012684	0,00204	0,0080077	18956,5	10125,25	11005,5	
2007Q4	565	545	313025	268000	5,66	124	19,5	0,0013828	0,00204	0,0080077	18956,5	10125,25	11005,5	
2008Q1	290	519	335025	287000	7,29	136	22,1	0,0005930	0,00211	0,00803105	19244,25	10332,75	10937,25	
2008Q2	405	379	335025	287000	7,29	132	20,4	0,0009388	0,00211	0,00803105	19244,25	10332,75	10937,25	
2008Q3	550	686	335025	287000	7,29	126	22,5	-0,0000108	0,00211	0,00803105	19244,25	10332,75	10937,25	
2008Q4	573	795	335025	287000	7,29	114	21,1	0,0014803	0,00211	0,00803105	19244,25	10332,75	10937,25	
2009Q1	344	570	350575	290000	4,91	126	28,8	0,0012084	0,00220	0,00806761	19573,75	10456,5	10807,25	
2009Q2	339	223	350575	290000	4,91	131	28	0,0014311	0,00220	0,00806761	19573,75	10456,5	10807,25	
2009Q3	295	508	350575	290000	4,91	128	26,8	0,0008910	0,00220	0,00806761	19573,75	10456,5	10807,25	
2009Q4	401	216	350575	290000	4,91	126	23,1	0,0011998	0,00220	0,00806761	19573,75	10456,5	10807,25	
2010Q1	333	284	366200	302250	4,52	142	28,5	0,0015936	0,00232	0,00819202	19868,5	10537,25	10688,5	
2010Q2	271	182	366200	302250	4,52	142	26,6	0,0014345	0,00232	0,00819202	19868,5	10537,25	10688,5	
2010Q3	405	203	366200	302250	4,52	136	26,2	0,0013083	0,00232	0,00819202	19868,5	10537,25	10688,5	
2010Q4	359	274	366200	302250	4,52	136	23,3	0,0013001	0,00232	0,00819202	19868,5	10537,25	10688,5	
2011Q1	404	302	382925	318500	4,75	146	27	0,0014650	0,00244	0,00834307	20194,5	10671,75	10617,5	
2011Q2	303	187	382925	318500	4,75	148	23,8	0,0013925	0,00244	0,00834307	20194,5	10671,75	10617,5	
2011Q3	380	469	382925	318500	4,75	145	25,5	0,0008731	0,00244	0,00834307	20194,5	10671,75	10617,5	
2011Q4	418	416	382925	318500	4,75	141	22,8	0,0016106	0,00244	0,00834307	20194,5	10671,75	10617,5	
2012Q1	326	282	400975	326750	4,84	160	25,4	0,0020733	0,00258	0,00851804	20335,75	10816,75	10561,5	
2012Q2	506	450	400975	326750	4,84	158	23,8	0,0017425	0,00258	0,00851804	20335,75	10816,75	10561,5	
2012Q3	585	298	400975	326750	4,84	157	24,8	0,0025267	0,00258	0,00851804	20335,75	10816,75	10561,5	
2012Q4	417	572	400975	326750	4,84	152	22,4	0,0017182	0,00258	0,00851804	20335,75	10816,75	10561,5	
2013Q1	353	337	418300	340750	4,75	173	26,3	0,0019892	0,00267	0,00869461	20771,25	11027,25	10551,5	
2013Q2	534	310	418300	340750	4,75	170	25,7	0,0019011	0,00267	0,00869461	20771,25	11027,25	10551,5	
2013Q3	458	338	418300	340750	4,75	161	26,8	0,0016393	0,00267	0,00869461	20771,25	11027,25	10551,5	
2013Q4	513	450	418300	340750	4,75	159	25,5	0,0019740	0,00267	0,00869461	20771,25	11027,25	10551,5	
2014Q1	388	348	434075	350750	4,61	175	26,8	0,0023466	0,00304	0,00876478	20260,5	12196	10553	
2014Q2	717	394	434075	350750	4,61	176	25,5	0,0011622	0,00304	0,00876478	20260,5	12196	10553	
2014Q3	449	362	434075	350750	4,61	174	26,5	0,0006961	0,00304	0,00876478	20260,5	12196	10553	
2014Q4	626	623	434075	350750	4,61	171	23,7	0,0012350	0,00304	0,00876478	20260,5	12196	10553	
2015Q1	336	511	456975	361250	3,93	188	26,4	0,0006802	0,00326	0,00910693	20760,25	12480	10511,75	
2015Q2	614	606	456975	361250	3,93	187	24,3	0,0005529	0,00326	0,00910693	20760,25	12480	10511,75	
2015Q3	581	395	456975	361250	3,93	180	25,7	0,0010928	0,00326	0,00910693	20760,25	12480	10511,75	
2015Q4	1051	755	456975	361250	3,93	173	23,4	0,0002802	0,00326	0,00910693	20760,25	12480	10511,75	
2016Q1	732	453	482900	365987	3,51	198	26	0,0009398	0,00343	0,00940107	21108	12746,75	10483,25	
2016Q2	987	645	482900	365987	3,51	202	23,4	0,0019484	0,00343	0,00940107	21108	12746,75	10483,25	
2016Q3	586	783	482900	365987	3,51	194	23,9	0,0012805	0,00343	0,00940107	21108	12746,75	10483,25	
2016Q4	733	637	482900	365987	3,51	193	21,9	0,0013244	0,00343	0,00940107	21108	12746,75	10483,25	

Oslo & Akershus														
year	housing_start	finished_dwellings	Household_debt	Disposable_Incom	Lending_rate	HousePrice_index	UnemploymentRate	PopGrowth_rate	HigherEducation	Above_67	Households_single	Households_couple_w/o_kids	Households_couple_w_kids
2005Q1	1590	1728	248950	169750	3,92	100	23,6	0,00298	0,00514	0,006720457	52864	23112	25106,5
2005Q2	2004	1745	248950	169750	3,92	100	21,5	0,00324	0,00514	0,006720457	52864	23112	25106,5
2005Q3	1194	1778	248950	169750	3,92	100	22,2	0,00521	0,00514	0,006720457	52864	23112	25106,5
2005Q4	2243	1547	248950	169750	3,92	100	19,7	0,00391	0,00514	0,006720457	52864	23112	25106,5
2006Q1	2432	2231	275950	176000	4,26	109	18,5	0,00483	0,00531	0,006636625	54712,25	23217	25552
2006Q2	2459	1868	275950	176000	4,26	113	16,5	0,00434	0,00531	0,006636625	54712,25	23217	25552
2006Q3	1249	1017	275950	176000	4,26	116	16,7	0,00500	0,00531	0,006636625	54712,25	23217	25552
2006Q4	1943	2039	275950	176000	4,26	117	13,9	0,00328	0,00531	0,006636625	54712,25	23217	25552
2007Q1	2221	2310	300225	189250	5,66	130	13	0,00495	0,00553	0,006568027	56664,75	23448,25	25944,25
2007Q2	2286	1455	300225	189250	5,66	130	11,6	0,00390	0,00553	0,006568027	56664,75	23448,25	25944,25
2007Q3	1554	1831	300225	189250	5,66	128	12	0,00585	0,00553	0,006568027	56664,75	23448,25	25944,25
2007Q4	1899	2172	300225	189250	5,66	124	9,9	0,00524	0,00553	0,006568027	56664,75	23448,25	25944,25
2008Q1	1538	1754	314650	202000	7,29	131	9,9	0,00685	0,00573	0,006469136	58722	24062,5	26374,5
2008Q2	1447	1958	314650	202000	7,29	130	8,9	0,00519	0,00573	0,006469136	58722	24062,5	26374,5
2008Q3	2019	1395	314650	202000	7,29	124	10,6	0,00657	0,00573	0,006469136	58722	24062,5	26374,5
2008Q4	1912	1653	314650	202000	7,29	113	11	0,00349	0,00573	0,006469136	58722	24062,5	26374,5
2009Q1	1205	2651	328100	204250	4,91	123	14,8	0,00462	0,00591	0,006392579	60890,75	24284,5	26840,75
2009Q2	632	1049	328100	204250	4,91	127	16,6	0,00316	0,00591	0,006392579	60890,75	24284,5	26840,75
2009Q3	745	1052	328100	204250	4,91	130	18,4	0,00573	0,00591	0,006392579	60890,75	24284,5	26840,75
2009Q4	940	1312	328100	204250	4,91	128	17	0,00474	0,00591	0,006392579	60890,75	24284,5	26840,75
2010Q1	815	992	342500	211250	4,52	137	19,1	0,00476	0,00611	0,006384396	60979,25	24935,5	27306,75
2010Q2	762	1025	342500	211250	4,52	138	18,6	0,00397	0,00611	0,006384396	60979,25	24935,5	27306,75
2010Q3	850	970	342500	211250	4,52	137	19,6	0,00651	0,00611	0,006384396	60979,25	24935,5	27306,75
2010Q4	1493	1572	342500	211250	4,52	135	18	0,00379	0,00611	0,006384396	60979,25	24935,5	27306,75
2011Q1	2604	836	359700	219750	4,75	148	18,5	0,00705	0,00635	0,006429431	61354,75	25461	27759
2011Q2	1718	681	359700	219750	4,75	150	16,5	0,00423	0,00635	0,006429431	61354,75	25461	27759
2011Q3	1837	891	359700	219750	4,75	149	17,2	0,00637	0,00635	0,006429431	61354,75	25461	27759
2011Q4	1882	1410	359700	219750	4,75	146	15,5	0,00373	0,00635	0,006429431	61354,75	25461	27759
2012Q1	1354	905	380125	228000	4,84	159	16,5	0,00578	0,00658	0,006548796	61471,75	26144,5	28340,25
2012Q2	1733	1240	380125	228000	4,84	161	15,5	0,00354	0,00658	0,006548796	61471,75	26144,5	28340,25
2012Q3	2273	2692	380125	228000	4,84	160	16,7	0,00474	0,00658	0,006548796	61471,75	26144,5	28340,25
2012Q4	1914	2352	380125	228000	4,84	159	15,5	0,00363	0,00658	0,006548796	61471,75	26144,5	28340,25
2013Q1	2856	1681	402000	236500	4,75	171	16,9	0,00392	0,00675	0,006660924	62323,25	26654,25	28756,75
2013Q2	1440	1869	402000	236500	4,75	170	16,4	0,00429	0,00675	0,006660924	62323,25	26654,25	28756,75
2013Q3	1547	1763	402000	236500	4,75	166	18,1	0,00513	0,00675	0,006660924	62323,25	26654,25	28756,75
2013Q4	1934	2192	402000	236500	4,75	160	17,2	0,00324	0,00675	0,006660924	62323,25	26654,25	28756,75
2014Q1	969	1688	418150	243750	4,61	170	19	0,00524	0,00748	0,006783479	57879,75	30121	29330,25
2014Q2	1698	1781	418150	243750	4,61	172	17,8	0,00409	0,00748	0,006783479	57879,75	30121	29330,25
2014Q3	945	1327	418150	243750	4,61	172	19	0,00613	0,00748	0,006783479	57879,75	30121	29330,25
2014Q4	1594	1909	418150	243750	4,61	170	17,6	0,00289	0,00748	0,006783479	57879,75	30121	29330,25
2015Q1	1680	1132	436900	251000	3,93	187	18,9	0,00407	0,00789	0,006957737	58623,75	30421	29762,5
2015Q2	1760	2081	436900	251000	3,93	189	17,8	0,00368	0,00789	0,006957737	58623,75	30421	29762,5
2015Q3	1460	1256	436900	251000	3,93	188	18,8	0,00562	0,00789	0,006957737	58623,75	30421	29762,5
2015Q4	1952	1495	436900	251000	3,93	185	17	0,00304	0,00789	0,006957737	58623,75	30421	29762,5
2016Q1	2106	1235	461685,6731	254252,75	3,51	203	18,4	0,00381	0,00814	0,007076453	59536,25	31136,25	30190,75
2016Q2	2339	1884	461685,6731	254252,75	3,51	210	16,8	0,00358	0,00814	0,007076453	59536,25	31136,25	30190,75
2016Q3	2547	1256	461685,6731	254252,75	3,51	215	17	0,00498	0,00814	0,007076453	59536,25	31136,25	30190,75
2016Q4	3120	2090	461685,6731	254252,75	3,51	219	15,4	0,00209	0,00814	0,007076453	59536,25	31136,25	30190,75

South East													
year	housing_start	finished_dwellings	Household_debt	Disposable_Income	Lending_rate	HousePrice_Index	UnemploymentRate	PopGrowth_rate	HigherEducation	Above_67	Households_single	Households_couple_(	Households_couple_w_kids
2005Q1	1673	1342	374650	321000	3,92	100	45,6	0,000759247	0,00187	0,00848351	35708	22718,25	21660
2005Q2	1087	1195	374650	321000	3,92	100	39,2	0,001600514	0,00187	0,00848351	35708	22718,25	21660
2005Q3	1213	1173	374650	321000	3,92	100	42,3	0,001762914	0,00187	0,00848351	35708	22718,25	21660
2005Q4	1687	1599	374650	321000	3,92	100	37,6	0,001287094	0,00187	0,00848351	35708	22718,25	21660
2006Q1	1299	1047	409200	334000	4,26	106	37,9	0,000943103	0,00194	0,00848973	36240,5	23114,25	21693
2006Q2	1156	978	409200	334000	4,26	109	32	0,002352741	0,00194	0,00848973	36240,5	23114,25	21693
2006Q3	1340	920	409200	334000	4,26	112	33	0,002154312	0,00194	0,00848973	36240,5	23114,25	21693
2006Q4	1619	1515	409200	334000	4,26	112	26	0,001573317	0,00194	0,00848973	36240,5	23114,25	21693
2007Q1	1104	860	449975	359000	5,66	119	27,5	0,001303113	0,00202	0,00846125	36776,25	23499	21735
2007Q2	1368	1390	449975	359000	5,66	123	22,6	0,00320861	0,00202	0,00846125	36776,25	23499	21735
2007Q3	1475	948	449975	359000	5,66	125	24,6	0,003383037	0,00202	0,00846125	36776,25	23499	21735
2007Q4	1625	1491	449975	359000	5,66	123	20,3	0,002828246	0,00202	0,00846125	36776,25	23499	21735
2008Q1	1292	995	472650	385000	7,29	127	22,1	0,002375138	0,00210	0,00842431	37962	23879,25	21872,75
2008Q2	1051	1080	472650	385000	7,29	125	19,1	0,003225867	0,00210	0,00842431	37962	23879,25	21872,75
2008Q3	792	1419	472650	385000	7,29	124	21,9	0,003588194	0,00210	0,00842431	37962	23879,25	21872,75
2008Q4	761	1155	472650	385000	7,29	116	24,3	0,001820899	0,00210	0,00842431	37962	23879,25	21872,75
2009Q1	610	1047	494800	388250	4,91	121	35,6	0,00164257	0,00217	0,00806476	38901,75	24043,25	21866
2009Q2	677	813	494800	388250	4,91	124	36,1	0,002758812	0,00217	0,00806476	38901,75	24043,25	21866
2009Q3	718	476	494800	388250	4,91	127	38,1	0,002469823	0,00217	0,00806476	38901,75	24043,25	21866
2009Q4	879	783	494800	388250	4,91	126	33,2	0,002825417	0,00217	0,00806476	38901,75	24043,25	21866
2010Q1	761	749	517825	401500	4,52	133	41,3	0,002046612	0,00227	0,00836434	39478,25	24218,5	21914,5
2010Q2	566	479	517825	401500	4,52	134	38,2	0,003233941	0,00227	0,00836434	39478,25	24218,5	21914,5
2010Q3	561	529	517825	401500	4,52	134	38,7	0,003209594	0,00227	0,00836434	39478,25	24218,5	21914,5
2010Q4	943	729	517825	401500	4,52	133	36,2	0,002206542	0,00227	0,00836434	39478,25	24218,5	21914,5
2011Q1	1058	752	545075	422750	4,75	139	41	0,00251058	0,00238	0,00843671	39997,5	24446,5	21997,5
2011Q2	800	642	545075	422750	4,75	142	36	0,003549784	0,00238	0,00843671	39997,5	24446,5	21997,5
2011Q3	838	543	545075	422750	4,75	143	37,9	0,003366772	0,00238	0,00843671	39997,5	24446,5	21997,5
2011Q4	1120	1112	545075	422750	4,75	142	34,9	0,002382598	0,00238	0,00843671	39997,5	24446,5	21997,5
2012Q1	1015	726	572800	436750	4,84	149	39	0,002374829	0,00249	0,00862271	40303,5	24828,25	22165,75
2012Q2	1174	868	572800	436750	4,84	151	35,6	0,003297561	0,00249	0,00862271	40303,5	24828,25	22165,75
2012Q3	1068	972	572800	436750	4,84	152	37,4	0,003496068	0,00249	0,00862271	40303,5	24828,25	22165,75
2012Q4	1216	924	572800	436750	4,84	151	33,8	0,002038179	0,00249	0,00862271	40303,5	24828,25	22165,75
2013Q1	799	817	599650	451000	4,75	157	37,9	0,001511472	0,00257	0,00881486	40848,75	25218,25	22179
2013Q2	1009	936	599650	451000	4,75	158	35,7	0,003040209	0,00257	0,00881486	40848,75	25218,25	22179
2013Q3	1174	735	599650	451000	4,75	158	38,1	0,002534636	0,00257	0,00881486	40848,75	25218,25	22179
2013Q4	1262	980	599650	451000	4,75	154	35,4	0,00211168	0,00257	0,00881486	40848,75	25218,25	22179
2014Q1	1086	911	623275	464250	4,61	161	41,2	0,001862779	0,00288	0,00907163	39285	27304,5	22378
2014Q2	1340	1078	623275	464250	4,61	161	39,3	0,002573804	0,00288	0,00907163	39285	27304,5	22378
2014Q3	1130	1052	623275	464250	4,61	164	41,1	0,001893564	0,00288	0,00907163	39285	27304,5	22378
2014Q4	1088	1131	623275	464250	4,61	162	37,4	0,00090297	0,00288	0,00907163	39285	27304,5	22378
2015Q1	879	1029	650225	476500	3,93	171	41,2	0,001410066	0,00306	0,0093653	39748,5	27555,75	22297,5
2015Q2	1170	1180	650225	476500	3,93	173	37,5	0,003091233	0,00306	0,0093653	39748,5	27555,75	22297,5
2015Q3	1368	793	650225	476500	3,93	174	38,8	0,002227433	0,00306	0,0093653	39748,5	27555,75	22297,5
2015Q4	1734	1267	650225	476500	3,93	172	36,5	0,001909199	0,00306	0,0093653	39748,5	27555,75	22297,5
2016Q1	977	927	687112,7644	481021,25	3,51	180	41,1	0,001131966	0,00318	0,00959068	40502,5	27930,25	22324,75
2016Q2	1969	1257	687112,7644	481021,25	3,51	184	36,4	0,003446818	0,00318	0,00959068	40502,5	27930,25	22324,75
2016Q3	1562	1216	687112,7644	481021,25	3,51	189	36,3	0,001993884	0,00318	0,00959068	40502,5	27930,25	22324,75
2016Q4	1528	1355	687112,7644	481021,25	3,51	189	33,9	0,001482604	0,00318	0,00959068	40502,5	27930,25	22324,75

							Trøndelag						
year	housing_start	finished_dwellings	Household_debt	Disposable_Income	Lending_rate	HousePrice_index	UnemploymentRate	PopGrowth_rate	HigherEducation	Above_67	Households_single	Households_couple_w/o_kids	Households_couple_w_kids
2005Q1	542	750	177025	160750	3,92	100	25,3	0,0018403	0,002890646	0,0078448	16036	9313,5	10178,5
2005Q2	789	573	177025	160750	3,92	100	21,6	0,0015258	0,002890646	0,0078448	16036	9313,5	10178,5
2005Q3	510	446	177025	160750	3,92	100	23,1	0,0022368	0,002890646	0,0078448	16036	9313,5	10178,5
2005Q4	1023	1286	177025	160750	3,92	100	19,2	0,0020532	0,002890646	0,0078448	16036	9313,5	10178,5
2006Q1	857	801	198975	167250	4,26	112	20,1	0,0023658	0,002993133	0,0077988	16414,25	9562	10192,5
2006Q2	623	469	198975	167250	4,26	110	17	0,0019430	0,002993133	0,0077988	16414,25	9562	10192,5
2006Q3	717	542	198975	167250	4,26	111	17	0,0024640	0,002993133	0,0077988	16414,25	9562	10192,5
2006Q4	847	1078	198975	167250	4,26	116	13,7	0,0026177	0,002993133	0,0077988	16414,25	9562	10192,5
2007Q1	679	762	217650	179000	5,66	124	14,5	0,0021132	0,003139788	0,0077205	16955	9768	10189,25
2007Q2	467	660	217650	179000	5,66	123	12,6	0,0019620	0,003139788	0,0077205	16955	9768	10189,25
2007Q3	308	640	217650	179000	5,66	120	13,6	0,0043778	0,003139788	0,0077205	16955	9768	10189,25
2007Q4	591	1133	217650	179000	5,66	121	11,7	0,0036148	0,003139788	0,0077205	16955	9768	10189,25
2008Q1	647	622	229175	192000	7,29	128	13,2	0,0032360	0,003260459	0,0076692	17602,75	10007,75	10239
2008Q2	383	384	229175	192000	7,29	125	11,6	0,0018832	0,003260459	0,0076692	17602,75	10007,75	10239
2008Q3	332	316	229175	192000	7,29	122	12,8	0,0033834	0,003260459	0,0076692	17602,75	10007,75	10239
2008Q4	339	543	229175	192000	7,29	113	13,1	0,0025650	0,003260459	0,0076692	17602,75	10007,75	10239
2009Q1	294	306	240600	195000	4,91	123	19	0,0024339	0,003374011	0,0076675	18031,25	10102,25	10264,5
2009Q2	207	269	240600	195000	4,91	123	18,2	0,0022942	0,003374011	0,0076675	18031,25	10102,25	10264,5
2009Q3	256	186	240600	195000	4,91	122	18,1	0,0040628	0,003374011	0,0076675	18031,25	10102,25	10264,5
2009Q4	430	328	240600	195000	4,91	126	15,7	0,0023390	0,003374011	0,0076675	18031,25	10102,25	10264,5
2010Q1	717	180	252150	203250	4,52	137	19,7	0,0012153	0,00351256	0,0077508	18287,75	10209,5	10279,25
2010Q2	385	193	252150	203250	4,52	136	17,1	0,0016469	0,00351256	0,0077508	18287,75	10209,5	10279,25
2010Q3	283	255	252150	203250	4,52	135	17,2	0,0048121	0,00351256	0,0077508	18287,75	10209,5	10279,25
2010Q4	325	340	252150	203250	4,52	138	15,5	0,0020172	0,00351256	0,0077508	18287,75	10209,5	10279,25
2011Q1	569	869	267875	213500	4,75	150	17,9	0,0021774	0,003703163	0,0078621	18459	10340,75	10317,75
2011Q2	608	227	267875	213500	4,75	150	15	0,0019291	0,003703163	0,0078621	18459	10340,75	10317,75
2011Q3	197	372	267875	213500	4,75	150	15,2	0,0057319	0,003703163	0,0078621	18459	10340,75	10317,75
2011Q4	305	487	267875	213500	4,75	153	12,8	0,0021584	0,003703163	0,0078621	18459	10340,75	10317,75
2012Q1	1184	390	286200	220750	4,84	164	15,3	0,0032527	0,003876613	0,0079719	18643,75	10577,75	10365,75
2012Q2	809	560	286200	220750	4,84	164	13,5	0,0015552	0,003876613	0,0079719	18643,75	10577,75	10365,75
2012Q3	890	430	286200	220750	4,84	161	14,1	0,0057751	0,003876613	0,0079719	18643,75	10577,75	10365,75
2012Q4	654	495	286200	220750	4,84	165	12,6	0,0029340	0,003876613	0,0079719	18643,75	10577,75	10365,75
2013Q1	936	890	306125	231250	4,75	178	14,6	0,0023856	0,003965251	0,0081503	19029	10746,25	10412,25
2013Q2	656	663	306125	231250	4,75	172	13,3	0,0006115	0,003965251	0,0081503	19029	10746,25	10412,25
2013Q3	738	803	306125	231250	4,75	170	14,3	0,0046863	0,003965251	0,0081503	19029	10746,25	10412,25
2013Q4	723	1166	306125	231250	4,75	169	13,7	0,0017591	0,003965251	0,0081503	19029	10746,25	10412,25
2014Q1	780	568	323875	238500	4,61	179	16,4	0,0021118	0,004351748	0,0082764	19343,75	12254,25	10543,75
2014Q2	836	947	323875	238500	4,61	178	15,2	0,0013476	0,004351748	0,0082764	19343,75	12254,25	10543,75
2014Q3	887	497	323875	238500	4,61	174	16,2	0,0048841	0,004351748	0,0082764	19343,75	12254,25	10543,75
2014Q4	874	630	323875	238500	4,61	181	14,7	0,0016965	0,004351748	0,0082764	19343,75	12254,25	10543,75
2015Q1	1125	643	341625	244750	3,93	190	17	0,0015635	0,004619616	0,0085117	19699,75	12568	10535,25
2015Q2	1275	869	341625	244750	3,93	189	15,5	0,0009967	0,004619616	0,0085117	19699,75	12568	10535,25
2015Q3	872	484	341625	244750	3,93	186	17,2	0,0044325	0,004619616	0,0085117	19699,75	12568	10535,25
2015Q4	715	746	341625	244750	3,93	186	15,3	0,0019180	0,004619616	0,0085117	19699,75	12568	10535,25
2016Q1	955	881	361005,6491	247024,5	3,51	202	16,9	0,0016164	0,00476607	0,0087329	20108,5	12875,25	10615,5
2016Q2	962	1058	361005,6491	247024,5	3,51	198	14,2	0,0016671	0,00476607	0,0087329	20108,5	12875,25	10615,5
2016Q3	867	718	361005,6491	247024,5	3,51	197	14,5	0,0050770	0,00476607	0,0087329	20108,5	12875,25	10615,5
2016Q4	1249	1179	361005,6491	247024,5	3,51	200	13	0,0023328	0,00476607	0,0087329	20108,5	12875,25	10615,5

West													
year	housing_start	finished_dwellings	Household_debt	Disposable_Income	Lending_rate	HousePrice_index	UnemploymentRate	PopGrowth_rate	HigherEducation	Above_67	Households_singl	Households_couple_w/o_kids	Households_couple_w_kids
2005Q1	1330	1162	259800	254000	3,92	100	32,3	0,0012474	0,002262276	0,0080337	30046,75	17169	20446,5
2005Q2	1163	1180	259800	254000	3,92	100	27,2	0,0017526	0,002262276	0,0080337	30046,75	17169	20446,5
2005Q3	1310	1146	259800	254000	3,92	100	28,8	0,0010405	0,002262276	0,0080337	30046,75	17169	20446,5
2005Q4	1430	1241	259800	254000	3,92	100	23,8	0,0011353	0,002262276	0,0080337	30046,75	17169	20446,5
2006Q1	1143	844	289975	265000	4,26	114	23,1	0,0010594	0,002360353	0,0080306	30686	17549	20413,25
2006Q2	1267	933	289975	265000	4,26	112	19,8	0,0014818	0,002360353	0,0080306	30686	17549	20413,25
2006Q3	1023	878	289975	265000	4,26	115	19,9	0,0012465	0,002360353	0,0080306	30686	17549	20413,25
2006Q4	1874	1326	289975	265000	4,26	118	15,3	0,0012400	0,002360353	0,0080306	30686	17549	20413,25
2007Q1	1362	1173	317200	286000	5,66	130	16,2	0,0016207	0,0024888	0,0079994	31218,75	17895	20358
2007Q2	1589	958	317200	286000	5,66	129	13,3	0,0021060	0,0024888	0,0079994	31218,75	17895	20358
2007Q3	1267	1043	317200	286000	5,66	127	14	0,0030149	0,0024888	0,0079994	31218,75	17895	20358
2007Q4	1976	1968	317200	286000	5,66	124	10,8	0,0024012	0,0024888	0,0079994	31218,75	17895	20358
2008Q1	1298	1327	335900	307250	7,29	132	12,3	0,0025879	0,002611341	0,0079507	32168,75	18337,75	20396,5
2008Q2	1050	1131	335900	307250	7,29	128	11,1	0,0028405	0,002611341	0,0079507	32168,75	18337,75	20396,5
2008Q3	1024	1169	335900	307250	7,29	118	12,4	0,0030702	0,002611341	0,0079507	32168,75	18337,75	20396,5
2008Q4	1004	1232	335900	307250	7,29	115	12,6	0,0026840	0,002611341	0,0079507	32168,75	18337,75	20396,5
2009Q1	1325	1186	352125	310250	4,91	125	19	0,0026198	0,002737315	0,0078926	33265	18634,5	20396,75
2009Q2	931	969	352125	310250	4,91	127	19,6	0,0028911	0,002737315	0,0078926	33265	18634,5	20396,75
2009Q3	1005	640	352125	310250	4,91	127	20,5	0,0036761	0,002737315	0,0078926	33265	18634,5	20396,75
2009Q4	1079	845	352125	310250	4,91	127	18,1	0,0036650	0,002737315	0,0078926	33265	18634,5	20396,75
2010Q1	1100	1025	371500	319750	4,52	137	23,4	0,0036564	0,002871198	0,0078905	33848,5	19006,5	20536
2010Q2	1041	679	371500	319750	4,52	138	21,3	0,0028930	0,002871198	0,0078905	33848,5	19006,5	20536
2010Q3	1513	772	371500	319750	4,52	136	21,6	0,0036207	0,002871198	0,0078905	33848,5	19006,5	20536
2010Q4	1149	1141	371500	319750	4,52	136	19,4	0,0021835	0,002871198	0,0078905	33848,5	19006,5	20536
2011Q1	1321	1106	395800	335250	4,75	153	22,8	0,0025996	0,003025486	0,007968	34497	19343,25	20615,5
2011Q2	1099	847	395800	335250	4,75	146	19,2	0,0026200	0,003025486	0,007968	34497	19343,25	20615,5
2011Q3	835	1004	395800	335250	4,75	146	19,4	0,0035764	0,003025486	0,007968	34497	19343,25	20615,5
2011Q4	1232	1103	395800	335250	4,75	149	17,3	0,0024035	0,003025486	0,007968	34497	19343,25	20615,5
2012Q1	1327	975	419625	346750	4,84	161	18,7	0,0028139	0,003174891	0,0080569	34758	19826,75	20766,75
2012Q2	1098	1083	419625	346750	4,84	155	17,1	0,0028515	0,003174891	0,0080569	34758	19826,75	20766,75
2012Q3	1216	1141	419625	346750	4,84	155	17,9	0,0044603	0,003174891	0,0080569	34758	19826,75	20766,75
2012Q4	1348	1072	419625	346750	4,84	156	15,7	0,0024882	0,003174891	0,0080569	34758	19826,75	20766,75
2013Q1	1162	1041	444000	363500	4,75	168	18,5	0,0023273	0,003266239	0,0081666	35587	20177,75	20900,75
2013Q2	1075	1003	444000	363500	4,75	168	17,5	0,0021422	0,003266239	0,0081666	35587	20177,75	20900,75
2013Q3	1306	1543	444000	363500	4,75	163	19	0,0038478	0,003266239	0,0081666	35587	20177,75	20900,75
2013Q4	1418	1483	444000	363500	4,75	158	17,9	0,0026080	0,003266239	0,0081666	35587	20177,75	20900,75
2014Q1	906	1005	466250	374250	4,61	172	20,5	0,0021890	0,003705185	0,0082825	34903,5	22572,75	21091
2014Q2	1117	1006	466250	374250	4,61	170	18,8	0,0018276	0,003705185	0,0082825	34903,5	22572,75	21091
2014Q3	1193	1133	466250	374250	4,61	168	19,7	0,0038100	0,003705185	0,0082825	34903,5	22572,75	21091
2014Q4	1307	1449	466250	374250	4,61	168	17,8	0,0018513	0,003705185	0,0082825	34903,5	22572,75	21091
2015Q1	1031	1218	490575	382750	3,93	184	21,7	0,0020085	0,003925077	0,0084966	35525,75	23032,5	21110
2015Q2	1201	1032	490575	382750	3,93	182	20,8	0,0020180	0,003925077	0,0084966	35525,75	23032,5	21110
2015Q3	1173	996	490575	382750	3,93	177	22,7	0,0028306	0,003925077	0,0084966	35525,75	23032,5	21110
2015Q4	1397	1298	490575	382750	3,93	174	22,8	0,0011164	0,003925077	0,0084966	35525,75	23032,5	21110
2016Q1	1208	1261	518405,6971	384959,75	3,51	189	27,4	0,0012207	0,004023919	0,0087256	36117,5	23508	21195,75
2016Q2	1521	1090	518405,6971	384959,75	3,51	181	24,5	0,0016741	0,004023919	0,0087256	36117,5	23508	21195,75
2016Q3	1704	1297	518405,6971	384959,75	3,51	182	24,7	0,0028169	0,004023919	0,0087256	36117,5	23508	21195,75
2016Q4	1289	1356	518405,6971	384959,75	3,51	181	23,9	0,0000937	0,004023919	0,0087256	36117,5	23508	21195,75

Appendix 5: Mail correspondence from Xu Cong Qio, NAV

(PK) NAV Statistikk 2826 <nav.statistikk@nav.no>
fredag 16. juni 2017 10.57
Til: Camilla Maltina Gravdal
Kopi: (PK) NAV Statistikk 2826; Åsland, Eirik
Helt ledige. Kommune. ÅR_MÅNED. 2000-2016.xls (2,1 MB) Forhåndsvisning

Hei

Her er en oversikt over antall helt ledige arbeidssøkere og i prosent av arbeidsstyrken, per måned fordelt på fylke og bostedskommune fra og med år 2000 til 2016. Du kan velge å beregne kvartals gjennomsnitt eller bruke status ved utgang av kvartalet som dine kvartalstall.

I henhold til Statistikklovens § 2-6 har NAV valgt å erstatte verdier i veller hvor tallene er mindre enn 4 med spesialtegn «*».

Med vennlig hilsen

Xu Cong Qiu
Seniorrådgiver // Statistikkseksjonen
Kunnskapsavdelingen // Arbeids- og velferdsdirektoratet
xu.cong.qiu@nav.no

Appendix 6: Partnership contract

Oslo, 21/04/17

Agreement about how to split the work done together for our master thesis cooperation:

We have decided to split the documents written for our master thesis after who has written them. We understand that it is our responsibility not to copy each other work, and thereby risk getting caught for cheating due to plagiarism.

- Camilla Maltina Gravdal has the sole right to the theoretical part concerning housing bubble theory.
- Camilla Løfsgaard Lie has the sole right to the theoretical part concerning housing supply and housing demand, the introduction, the motivation for the topic choice, and all the empirical data that is gathered and reproduced (including graphs and figures).

Camilla Maltina Gravdal Camilla M. Gravdal

Camilla Løfsgaard Lie Camilla L. Lie