



**Apartment price determinants:  
A comparison between Sweden and Germany.**

Sviatlana Anop

Licentiate Thesis

Building & Real Estate Economics  
Department of Real Estate and Construction Management  
Royal Institute of Technology  
Kungliga Tekniska Högskolan

**Stockholm 2015**

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Royal Institute of Technology (KTH)  
Building & Real Estate Economics  
Department of Real Estate and Construction Management  
SE-100 44 Stockholm

Printed by Universitetservice US-AB Stockholm

TRITA-FOB-LIC 2015:2  
ISBN 978-91-85783-47-2

## Acknowledgements

I would like to express my deep gratitude to:

- My research supervisor professor Hans Lind, “A Man of opportunities”, who always gives me a billion and one more chance to try and to improve;
- My second supervisor Kerstin Annadotter for her wise comments and constructive critiques of this thesis;
- Professor Mats Wilhelmsson for his useful suggestions and guidance in the complex world of econometrics.

Finally, I would like to acknowledge all the support provided by my friends and colleagues at the Department of Building and Real Estate Economics, Royal Institute of Technology.

Special thanks are going to the two “fundamental” persons in my life - Joakim, “A Man with a Big heart” and Alexander, “A little boy with adorable smile” and “Non-fundamental”, but not less important - my closest friends and family members.

Stockholm, February 2015

Sviatlana Anop

## Abstract

Similar development of economic fundamentals in Germany over the last two decades did not lead to the same dramatic house price increases as it is in Sweden. What can explain this house price stability over a long period? This thesis attempts to find the answer this question.

The first paper in this thesis contains an extended literature review on the studies focused on the factors affecting house prices in the short and in the long run. Existing literature adopts a broad variation of approaches and reaches different conclusions attempting to answer the question about what are the key drivers of house prices. Conclusions often depend on the model specifications and econometric methods applied. Though there is a considerable agreement in real estate economics theory regarding the main factors that affect house prices (or so called “fundamental determinants”), it is hard to find a consistent definition regarding what factors can be considered as “fundamentals” and what factors belong to “non-fundamentals”. The dominating factors that are presented in the majority of the studies are income, population, interest rate, housing stock and unemployment. Studies done after the recent financial crisis put more attention on such factors as the behavior of the market participants, financing conditions and regulations. The characteristics of the bank lending and valuation policies as well as regulations on the rental market have received attention in the research literature, but the impact of these factors on house price dynamics is not measured and not well described. Therefore the other two papers in this thesis aim to provide a better insight in to the factors that create fluctuations in housing markets.

The second paper investigates the effects of macroeconomic indicators such as population, income housing stock, mortgage interest rate on house prices. Estimation is done by applying panel data methodology on regional data for major cities in Germany and Sweden and by using yearly observations from 1995 to 2010. Results suggest that the long-run development of apartment prices in Sweden can be explained by changes in such factors as population, disposable income per capita, mortgage interest rate, housing stock, and prices per square meter in the previous period. The price for the previous period has the highest impact in comparison with other factors in Sweden. At the same time for Germany this is the only factor that is valid for long-term house price development. Estimates for fundamental factors such as population, disposable income, mortgage interest rate and housing stock appeared as not significant in house price development in the long run in Germany. A closer analysis has shown that the fundamental factors developed in a similar way in both countries during the analyzed period, though the house prices dynamic is very different. The conclusion is that fundamental factors cannot provide an explanation for the differences in house price developments in two countries and further analysis of institutional differences in the housing markets is done in the third paper.

Third paper applies a comparative analysis approach and hypothetico-deductive method in order to examine the differences in the banking policies on mortgage financing and approaches to valuation of mortgage properties in Germany and Sweden. The results suggest that the extreme rise in Swedish house prices above the long-term trend was created by expanding bank lending policies that was supported by the general macroeconomic factors and regulation environment on the housing market. The main difference between countries in approaches to valuation for mortgage purposes is that in Germany that mortgage is based not on the market value as it is in Sweden, but on the long-run sustainable value, so called “fundamental” value. Mortgage lending value is determined in such a way that is also develops in the same tempo as fundamentals in the long-run and is not that procyclical as market value. Using a long-term sustainable value has a restrictive effect on the housing prices and in such a way stabilizes the market. One more factor that gives stability to the housing market in Germany is the well-functioning rental market. Third paper contributes to a better understanding of necessary conditions for the house prices to rise in the long run above the fundamentals level and suggests policy solutions that can reduce the risks of housing bubbles and increase financial stability.

## Sammanfattning

Ekonomiska fundamenta hur utvecklats på ungefär samma sätt i Tyskland och Sverige, men medan huspriserna i Sverige stigit kraftigt har de varit stabila i Tyskland. Vad kan förklara denna skillnad? Syftet med denna licentiatuppsats är att försöka förklara det.

Den första uppsatsen innehåller en omfattande litteraturoversikt rörande vad som styr huspriser på kort och lång sikt. Den existerande litteraturen innehåller många olika angreppssätt och kommer till olika svar om vad som driver huspriserna. Slutsatserna beror ofta på hur modellerna specificerats och vilken ekonometrisk metod som använts. Det finns dock betydande enighet i ekonomisk teori om vad som är de grundläggande faktorerna som styr huspriserna (så kallade fundamenta) så finns delade meningar om hur dessa exakt ska specificeras och vad som räknas som icke-fundamentala faktorer. De vanligaste fundamentala faktorerna i studierna är inkomst, befolkning, räntenivå, bostadsutbudet och arbetslöshet. Studier gjorda efter den senaste finanskrisen betonar med beteendefaktorer, finansieringsförhållande och regleringar. Egenskaperna hos bankernas långivning och värderingsprinciper liksom effekten av hur hyresmarknaden fungerar har då fått lite utrymme vilket motiverar att de behandlas mer ingående i denna studie.

Den andra uppsatsen undersöker effekterna av makroekonomiska indikatorer som befolkning, inkomst, bostadsutbud och räntenivåer på huspriser i Tyskland och Sverige. Studien begränsas till ett antal större städer och bygger på data från 1995-2010. Paneldataanalys används. Resultaten pekar på att den långsiktiga prisutvecklingen i Sverige kan förklaras av sådana fundamentala faktorer, men också att priset föregående period påverkar priset perioden efter. För Tyskland är enbart den sista faktorn av betydelse, dvs utvecklingen av de fundamentala faktorerna påverkar inte prisutvecklingen där. Trots att de fundamentala faktorerna utvecklas på liknande sätt så leder de inte till samma utveckling av huspriserna. Detta motiverar djupare studier av institutionella skillnader mellan bostadsmarknaderna i de båda länderna.

Den tredje uppsatsen är en jämförande studie som använder hypotetiskt deduktiv metod för att undersöka om skillnader i bankernas lånepolicy och skillnader i värdebegrepp kan förklara skillnader i prisutveckling på bostäder. Resultaten pekar på att de snabbt stigande priserna i Sverige kan förklaras med en expansiv långivning. En viktig skillnad är att medan långivning i Sverige grundas på aktuellt marknadsvärde medan den i Tyskland bygger på ett långsiktigt värde som ska spegla långsiktiga fundamentala faktorer, ett så kallat "mortgage lending value". Detta värde utvecklas mer sakta och ska inte svänga med konjunkturerna på det sätt som ett marknadsvärde normalt gör. Genom att långivning grundas på detta värde stabiliseras marknaden. En annan faktor som bidrar till att stabilisera de tyska bostadspriserna är att det finns en fungerande hyresmarknad som skapar ett alternativ till att köpa. Bidraget i den tredje uppsatsen är att öka vår förståelse av nödvändiga villkor för att huspriserna inte ska stiga snabbt och att den pekar på åtgärder som kan minska risken för prisbubblor på bostadsmarknaden, och minska risken för finansiell instabilitet.

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**Part I – Apartment price determinants: A comparison between Sweden and Germany. Introductory essay.**

### **Part II – Articles**

- 1 House price dynamics: A literature review.
- 2 House price determinants: A comparison between major cities in Germany and Sweden.
- 3 Comparison of valuation and lending policies in Germany and Sweden.

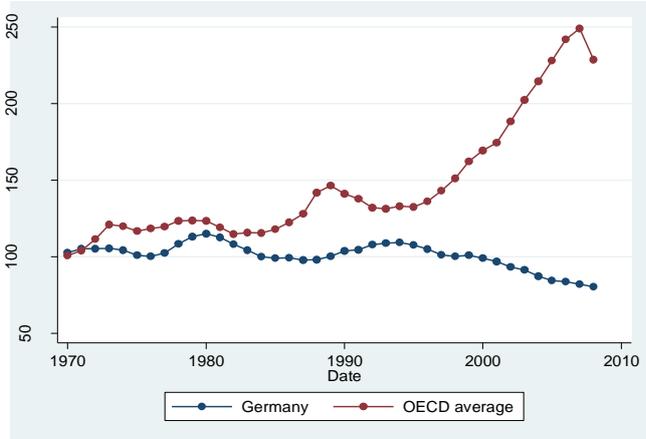
# Part I – Apartment price determinants: A comparison between Sweden and Germany. Introductory essay.

## 1. Introduction

### 1.1. Statement of the problem

Since 1990 a very fast growth of house prices can be observed in many countries, with the exception of Germany. Figure 1 displays a comparison of the house price dynamics on average in OECD countries and in Germany during 1970-2009.

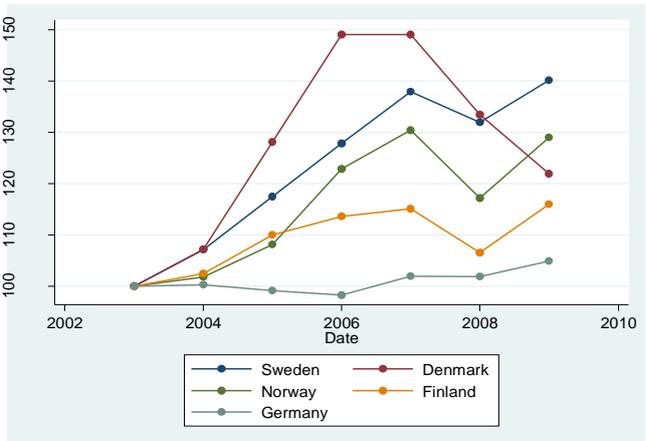
Figure 1. Real house prices (Index: 1st quarter 1970=100)



Source: OECD, House Prices Database

The Nordic region, with Sweden as an absolute leader in real house price increase, is remarkable in comparison to real house price dynamics in Germany (Figure 2).

Figure 2. Real house prices in Nordic countries and Germany (Index: 1st quarter 2004 =100)



Source: the BIS Database, Reuters EcoWin, Statistics Sweden and the Riksbank

Such extreme developments of house prices raise a question about the factors behind this dynamic. Existing research done in this area provides evidence that fundamental factors such as income, population, mortgage interest rate, housing stock, and other factors cannot provide a complete explanation, or give only partial explanation, of such extreme increases in prices. This in turn leads to a lot of debates about the emergence of a housing bubble. Consequences of the recent sub-prime mortgage crisis in United States highlight the importance of additional research in this area.

It is necessary to point out that the main focus of the existing research is on trying to provide explanations to the extreme increase in prices, and not on the seeking for factors that contribute to the stability of house prices in the long run. The German housing market demonstrates price stability during several decades and is therefore interesting to study. What are the factors that contribute to the differences in house price dynamics in the long-run? This thesis is going to seek answers to this question by comparing two countries with different patterns of house price growth: Sweden with extreme increase in house prices and Germany with more stable growth pattern. The main focus of the analysis is on the apartment segment of the housing market.

## **1.2. Research questions and objectives**

The different patterns of house price growth in Germany and Sweden and preliminary literature review raised several *research questions* to be explored in this thesis, including the following:

1. What are the main determinants of house prices in the long run and what are the models presented in the existing research?
2. Can differences in the long run house price dynamics between Germany and Sweden be explained by fundamental factors?
3. If the differences in house prices in the long run cannot be explained by fundamental factors, can they be explained by the differences in the bank lending policies, approaches to valuation for mortgage purposes and rental market regulations?

Aligned with the research problem and questions, the research presented in this thesis possesses several *objectives*, including:

- 1) Through understanding of the housing property market drivers identified in the existing research, refine our current understanding of the causes and effects of different factors affecting house prices in the long-run.
- 2) Give an overview of the existing determinants of house prices.
- 3) Quantify the impact of different factors on house prices in Germany and Sweden.
- 4) Explore the necessary conditions for extreme house price growth in the long run.
- 5) Discuss the role of the bank lending policies and approaches to valuation for mortgage purposes in house prices development, as well as the role of institutional factors such as rental market regulation.
- 6) Develop policy suggestions leading to price stability in the long run.

### **1.3. Outline of the thesis**

The introduction incorporates 5 sections, including this one. Section 2 details the adopted research methodology and includes description of the research process and research methods for data collection and analysis. Section 3 presents summaries of the three papers that are included in this thesis. Section 4 discusses the main findings of the research by relating them back to the initially stated research problem, objectives and research questions. Section 5 presents the main conclusions and recommendations for further exploration in the same field.

## **2. Methodology and research process**

Methodology is a link between theory and applied methods of a research project. Hart (1998) defines methodology as “A system of methods and rules to facilitate the collection and analysis of data.” (Hart, 1998, p.28). Johansson (2005) provides a similar definition of methodology as “A recommended set of methods for collecting and analyzing data.” (Johansson, 2005, p.17). These definitions were used for constructing conceptual research framework, which is necessary for knowledge development process, following the objectives of this study. Figure 3 maps the structure of this thesis in relation to adopted research methodology.

### **2.1. Research process**

Initially the types of house price determinants are identified through a literature review. The review also describes, through the existing research, the house price determinants in an international context. The established research questions are based on the identified research gaps in order to meet the objectives of this study.

Existing data and methods were used as a basis for the development of the house price determinants model. The data were statistically analyzed by using Stata program. The regression analysis of panel data was performed to identify any significant relationships between the house prices and the independent variables.

An hypothetico-deductive method was applied for the examination of the impact of the bank lending policies and the approaches to valuation in two case countries.

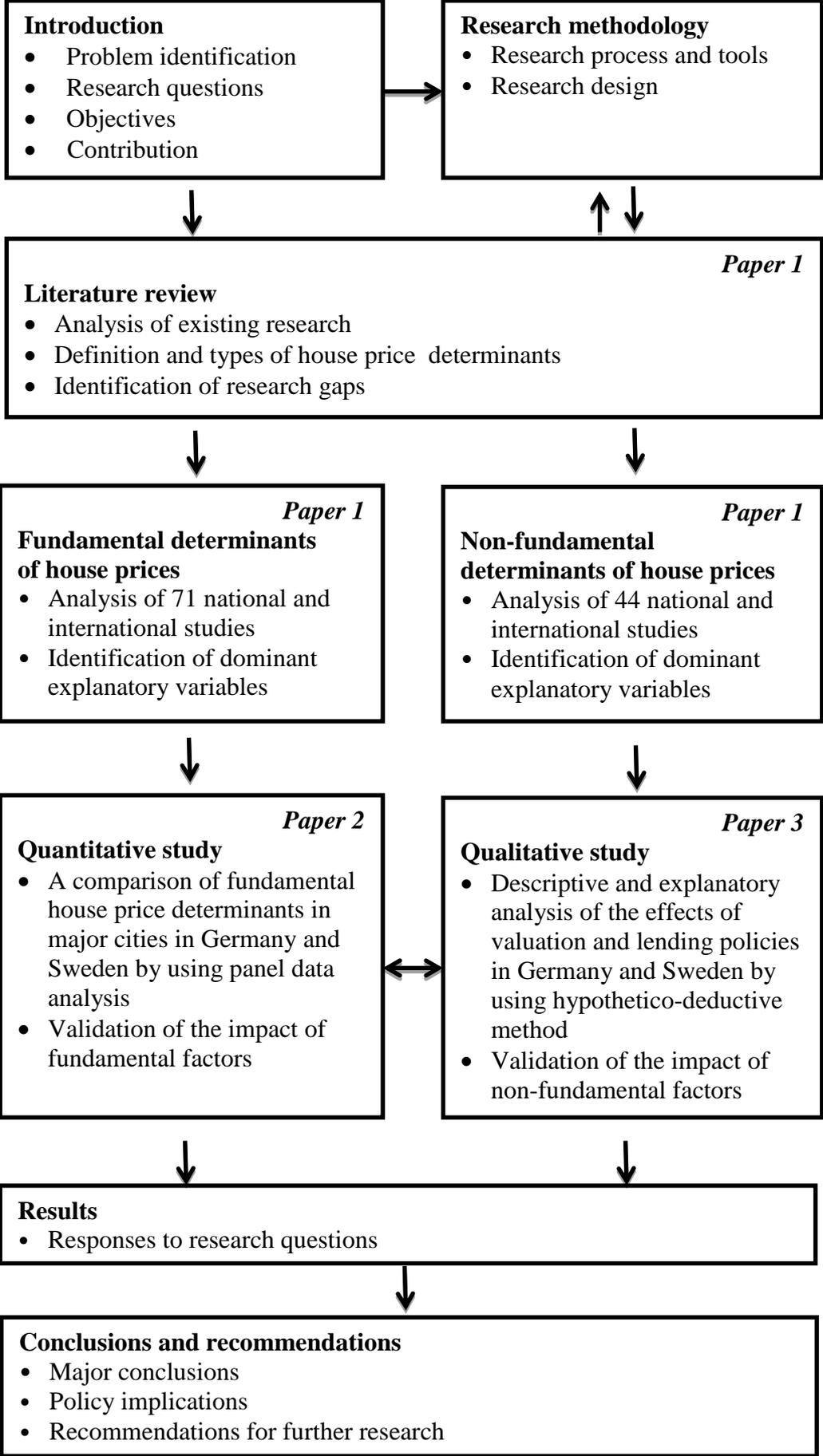
Details of the methods are presented in the papers.

Validation of the impact of these factors was done at the end, followed by conclusions and recommendations.

### **2.2. Research type**

This thesis represents a combination of quantitative and qualitative research as it sets out to test and confirm theories. The study includes elements of descriptive and explanatory research.

Figure 3. Thesis map showing thesis structure in relation to research methodology



### **3. Summary of the papers**

#### **3.1. Paper 1 “House price determinants: A literature review”**

The purpose of a literature review according to Hart (1998) is “The selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed.” (Hart, 1998, p.13)

Paper 1 of this thesis contains an extended literature review on the studies focused on the factors affecting house prices in the short and in the long run. Literature review covers 71 studies on fundamental house price determinants and 44 studies on factors affecting house prices that are different from fundamentals.

Existing literature adopts a broad variation of approaches and reaches different conclusions in the question about what are the key drivers of house prices. Conclusions of the studies greatly depend on the model specifications and econometric methods used in the literature. Though there is a considerable agreement in real estate economics theory regarding the main factors that affect house prices (or so called “fundamental determinants”), it is hard to find a consistent definition what kind of factors can be considered as fundamentals. The concept of “fundamental factors” first appeared in literature when Stiglitz (1990) discussed the concept of “bubble”. Stiglitz definition of a “bubble” is as follows: “the basic intuition is straightforward: 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” (Stiglitz’ 1990, p. 13). When Case and Schiller (2003) discussed the concept of “Bubble” in the housing market, they name the following factors as “fundamentals”: personal income per capita, population, employment, unemployment, housing starts, mortgage interest rates. Other studies in addition to the factors mentioned above consider factors like for example, construction costs or GDP growth, that also can be considered as fundamentals.

Due to the variety of nature of these factors and their different effects on house prices, it is hard to develop a good definition on what kind of factors can be considered as “fundamental” determinants of house prices. However, it is possible to highlight the dominating factors that are presented in the majority of the studies. They are:

- Income
- Population
- Interest rate
- Housing stock
- Unemployment/Employment.

A factor that has received little attention or often omitted in the existing research is “lagged house prices”.

Studies that were done after the recent financial crisis put more attention on other factors than fundamentals, such as behavior of the market participants, financing conditions or mortgage valuation policies. It is hard to make a good definition what kind of factors can be considered

as “non-fundamental”, but intuitively these are the factors that mainly lead to unexplained or unexpected fluctuations in prices on housing markets. The dominating “non-fundamental” factors in the research literature are:

- Optimistic expectations of the buyers
- Collateral cycles (i.e. “Financial accelerator” effect), which is related to credit constraints, equity withdrawal options and information asymmetry between borrowers and lenders that leads to appearance of the economic and financial cycles (see studies of Bernanke et al. (1996) and Borio et al (2002)).
- Financial liberalization, i.e. higher loan-to-value ratio, permissive mortgage approvals, etc.

Very little attention in studies included in this thesis is given to such factors as “Approaches to valuation for mortgage purposes”.

An overview of the studies presented in the literature review demonstrates that the degree of the impact of different factors often varies depending on the country analyzed. Researchers use different sources of data and applied models vary a lot. The characteristics of the bank lending and valuation policies as well as regulations on the rental market have received attention in the research literature, but the impact of these factors on house price dynamics is not measured and not well described. Therefore a further exploration is needed in order to provide a better insight in to the factors that creates fluctuations in housing markets.

### **3.2. Paper 2 “House price determinants: A comparison between major cities in Germany and Sweden”**

Paper 2 uses panel data methodology for quantifying the impact of major house price determinants in German and Swedish cities in the long run. The analysis is done by using empirical data from three major Swedish cities (Stockholm, Göteborg and Malmö) and seven big German cities (Bremen, Cologne, Düsseldorf, Frankfurt, Hamburg, Munich and Stuttgart). The data period include the years 2000-2010 for Sweden and years 1995-2010 for Germany. The originality of this paper is that this kind of comparative analysis on city level has not been done before.

The main method used in this paper is econometric analysis of panel data. Estimation is done by applying two types of models: static and dynamic.

Results suggest that the long-run development of apartment prices in Sweden can be explained by changes in such factors as population, disposable income per capita, mortgage interest rate, housing stock, and prices per square meter in the previous period. The price for the previous period has the highest impact in comparison with other factors in Sweden. At the same time for Germany this is the only factor that is valid for long-term house price development. Estimates for fundamental factors such as population, disposable income, mortgage interest rate and housing stock appeared as not significant in house price development in the long run in Germany.

However, this does not mean that they are not important. They probably have more local effects, i.e. can be estimated via individual regressions for each city, and the effects are

probably more of short-term character, than the long-term character, i.e. effects are “smoothed” in the long-run. Validation of the significance of the results is done by using the standard statistical procedures. A closer analysis has shown that the fundamental factors developed in a similar way in both countries during the analyzed period, though the house prices dynamic is very different.

The conclusion is that fundamental factors cannot provide an explanation for the differences in house price developments in two countries and further analysis of institutional differences in the housing markets is required.

### **3.3. Paper 3 “Comparison of valuation and lending policies in Germany and Sweden”**

Paper 3 provides a descriptive and explanatory analysis of the effects of valuation and lending policies by using hypothetico-deductive method and considering two countries: Germany and Sweden. Through the analysis of the housing market framework the paper describes how behavioural aspects like behaviour of market participants have an impact on house prices. The bank lending framework presented further explains how information asymmetry between borrowers and lenders lead to appearance of the economic and financial cycles that is known as an “financial accelerator” effect (see studies of Bernanke et al. (1996) and Borio et al (2002)).

The mortgage valuation framework points out that approaches to the determination of value for mortgage purposes include two major concepts: the open market value (MV) and the mortgage lending value (MLV), where the latter reflects only long-term sustainable aspects of a property, disregarding all speculative aspects. As a result MLV, in contrast to MV, shows little in the way of fluctuations. If lending is based on the MLV concept instead of the MV concept, the borrowers are not able to borrow more than MLV, which is stable in the long-run, which in turn lead to a lower willingness to pay and less speculative increases in house prices.

Validation of the impact of non-fundamental factors such as loan-to-value ratio (LTV), mortgage rates, amortization requirements is done by presenting numerical examples of applying two different concepts of MV and MLV based on actual characteristics of mortgage market in Germany and Sweden that can be observed during the analysed period. The example provides additional evidence that application of the different approaches to valuation for mortgage purposes can make lending for housing less procyclical by eliminating the effect of the “financial accelerator” and thereby stabilizing house prices in the long run.

The results of the analysis suggest that the extreme rise in Swedish house prices above the long-term trend was created by expanding bank lending policies. Excessive bank lending was not the sole reason for increase in prices, as it was supported by the general macroeconomic factors and the regulatory environment determining supply and demand on the housing market.

The main difference between countries in approaches to valuation for mortgage purposes is that in Germany that mortgage is based not on the market value as it is in Sweden, but on the long-run sustainable value, so called “fundamental” value. The effect of using such a long-run

sustainable value is that it is not procyclical like a market value. Mortgage lending value is determined in such a way that it also develops in the same tempo as fundamentals in the long-run.

Another major conclusion is that using a long-term sustainable value has a restrictive effect on the housing prices and in such a way stabilizes the market.

One more factor that gives stability to the housing market in Germany is the well-functioning rental market. Sweden has a rent control that makes additional pressure on house prices as this means that there is no good substitute segment on the market.

## 4. Results

### 4.1. Summary of the results

Section 1.2 states four research questions stemming from the problem statement (Section 1.1). The responses to these questions are presented below following the research objectives presented in Section 1.3. Table 1 repeats the research questions and presents responses to each question with regard to the findings detailed in this thesis.

*Table 1. Research questions and responses*

Research question	Response
<p>1. What are the main determinants of house prices in the long run and what are the models divulged through existing research?</p>	<p>The dominant fundamental determinants of house prices adopted in the literature include:</p> <ul style="list-style-type: none"> <li>• Income</li> <li>• Interest rate</li> <li>• Population</li> <li>• Unemployment</li> <li>• Housing stock</li> </ul> <p>The dominant non-fundamental determinants of house prices adopted in the literature include:</p> <ul style="list-style-type: none"> <li>• Optimistic expectations</li> <li>• Collateral cycles (i.e. “Financial accelerator” effect)</li> <li>• Financial liberalization.</li> </ul> <p>The literature review (Paper 1) detail 71 models on fundamental house price determinants and 44 models on non-fundamental price determinants. Details of these models are presented in Appendices A and C (Paper 1).</p> <p>The prevalent method of determining house price determinants is regression analysis.</p>
<p>2. Can the differences in the long run house price dynamics between Germany and Sweden be explained by fundamental factors?</p>	<p>Results of the panel data analysis presented in Paper 2 suggest that fundamental factors such as population, disposable income per capita, mortgage interest rate and apartment stock do have impact on house prices in the long-run in Sweden, but not in Germany. The effect of lagged house prices is significant in both cases and is highest in comparison with the impact from other factors. The general</p>

Research question	Response
	conclusion is that similar development of fundamentals in Germany and Sweden does not affect house prices dynamics in the same way.
3. If the differences in house prices in the long run cannot be explained by fundamental factors, can they be explained by the differences in the bank lending policies, approaches to valuation for mortgage purposes and rental market regulations?	Results presented in Paper 3 demonstrate that financial factors that belongs to the bank lending policies such as high LTV ratio, low interest rates, amortization free loans and other factors that are related to bank lending policies, are actually not the determinants of house price growth above the fundamental level, but the channels that make these price growth possible as a result of the applying different approach to mortgage valuations. Extreme increase in prices as a result of these policies creates necessary conditions for optimistic expectations to arise and makes speculations in the housing market possible. The use a different approach of valuation for mortgage purposes in Germany such as concept of “Mortgage Lending Value”, a long-run sustainable value is that it is not procyclical like a “Market value” concept, has a backward effect on the housing prices, stabilizing them in the long run. One more factor that gives stability on the housing market in Germany is the well-functioning rental market.

## 4.2. Reliability of the research

Three types of triangulation out of four according to Patton (1987) are applied in this thesis in order to assure the quality of the research.

1. Data triangulation, i.e. all data sources were checked for reliability.
2. Theory triangulation. Main findings presented in papers 2 and 3 correspond to the conclusions presented in Paper 1 and in such a way provide additional support to existing theories. (See, for example, conclusions regarding the effects of valuation policies presented in Zhu (2003), Tsatsaronis and Zhu (2004), Hilbers et al (2008), Adams and Füss, (2010)).
3. Methodological triangulation is used in order to strengthen the arguments presented in this thesis. Theoretical conclusions from literature review in Paper 1 are accompanied by results of applying a quantitative approach in paper 2 and a qualitative approach in Paper 3.

## 5. Conclusions, research contributions and recommendations

The analysis of the results presented in this thesis lead to the conclusion that the extreme rise in Swedish house prices above the long-term trend was created by expanding bank lending

policies that was supported by the regulatory environment on the housing market.

In distinction to previous research, the first major conclusion of this study is that such factors as high LTV ration, low interest rates, amortization free loans and other factors that are related to bank lending policies, are actually not the determinants of house price growth above the fundamental level, but the channels that make these price growth possible as a result of the applying different approach to mortgage valuations. Lending that is based on mortgage lending value can contribute to the stability in house prices in the long term period and create a safer lending environment on the housing market.

The second major conclusion is that application of the “Mortgage lending value” concept in valuations for mortgage purposes reduces the effect on the housing prices from changes in factors like income and interest rates. This is a stabilizing factor on housing market in Germany. One more factor that gives stability on the housing market in Germany is the well-functioning rental market. Sweden has a rent control that makes additional press on to house prices as there is no easily accessible substitute segment on the market

In such a way, this thesis contributes to a better understanding of necessary conditions for the house prices to rise in the long run above the fundamentals level and suggests policies that can reduce the risks of housing bubbles and thereby increase financial stability.

In undertaking this study a number of potential areas for further exploration became evident, including:

- Methodological issues regarding implementing the concept of “Mortgage lending value” in valuations for mortgage purposes in Sweden.
- Tools, institutions and policies to prevent developments in house prices from being a source of macroeconomic shocks.

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