REGIONAL HOUSING MARKETS IN BOOM AND BUST: THE EXPERIENCE OF FINLAND

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Abstract: This study examines the regional development of housing demand, supply and prices in Finland during the 1980s and 1990s. The focus is particularly on the deep recession of the early 1990s and on the preceding boom period. The analysis is based on an economic model that allows prices to be affected by bubble phenomena in addition to demographic and economic fundamentals. The model is estimated with panel data on NUTS4-level regions classified into four area groups. The results suggest that liberalisation of financial markets was a significant factor leading to the housing price boom. The boom and collapse of prices can mainly be explained by changes in income employment, interest rates and vacancy rates. There is little evidence of a price bubble. Housing construction has responded rather strongly to price changes after a time lag. Regional analysis reveals that the dramatic changes in housing prices and construction activity seen at the national level in both the boom and the recession were experienced essentially similarly in all regions. In the recovery period since about 1994, regional patterns have started to deviate. Vacancy rates have dropped and prices have increased much more strongly in the metropolitan area of Helsinki than elsewhere in the country. Housing construction has also responded to these changes. Nevertheless, regional differences in housing consumption have also started to increase. The recent regional polarisation in housing markets is mainly due to differences in employment growth and demographic changes.

Tiivistelmä: Tutkimus käsittelee asuntojen kysynnän, tarjonnan ja hintojen alueellista kehitystä 1980- ja 1990-luvuilla. Pääasiallinen kiinnostuksen kohde on 1990-luvun alun laman ja sitä edeltäneen talouden ylikuumenemisen aika. Tutkimus perustuu asuntomarkkinoiden taloudelliseen malliin, jossa asuntojen hintojen muutosta selitetään taloudellisten ja demografisten perustekijöiden lisäksi hintakuplalla. Malli estimoidaan käyttäen seutukuntatasoista paneeliaineistoa, jonka alueet on luokiteltu neljään alueryhmään. Tulosten mukaan rahoitusmarkkinoiden vapauttamisella oli merkittävä vaikutus asuntojen voimakkaan hintojen nousuun, Kuitenkin tärkeimmät selittäjät sekä hintojen nousulle että romahdukselle olivat tulojen, työllisyyden, korkojen sekä tyhjien asuntojen osuuden kehitys. Hintakuplan rooli oli tulosten mukaan vähäinen. Asuntotuotanto on reagoinut viiveellä asuntojen hintojen muutokseen. Alueellinen analyysi tuo esiin sen, että asuntojen hintojen ja asuntotuotannon dramaattiset muutokset nousun ja laman aikana koettiin olellisilta osiltaan samanlaisina kaikilla alueilla. Asuntomarkkinoiden lamasta toipumisen jälkeen, suunnilleen vuodesta 1995 alkaen, alueelliset erot asuntomarkkinoilla ovat alkaneet kasvaa. Tyhjien asuntojen osuus on supistunut ja hinnat ovat nousseet voimakkaammin Helsingin seudulla kuin muualla maassa. Asuntotuotanto on myös reagoinut muutoksiin. Myös asumiskulutuksen alueelliset erot ovat alkaneet kasvaa. Asuntomarkkinoiden viimeaikaisen alueellisen polarisoitumisen taustalla ovat ennen kaikkea työpaikkojen kasvun ja väestökehityksen voimakkaat alueelliset erot.

Avainsanat: Aluekehitys, asuntomarkkinat, asuntojen hinnat, lama

FOREWORD

Housing is a major element in household consumption and welfare. In Finland, dwellings are also the most significant household asset, the valuation of which influences household consumption and labour supply behaviour. Housing construction in turn is a significant and highly volatile component of total demand and employment.

At the same time, housing markets are basically local. Demand for housing depends on local demographic and economic conditions. Thus, changing regional growth patterns and the implied changes in the distribution of population greatly affect local housing demand. The supply of housing can nevertheless change only very slowly. Therefore vacancies and prices have to respond to shifts in demand. On the other hand, the availability and cost of housing are likely to significantly influence households' location decisions. A good understanding of the functioning of the housing market therefore calls for a regionally differentiated approach. However, systematic economic analysis of regional housing markets has been largely lacking in Finland, and is not very common elsewhere either. This study aims to at least partly fill the gap.

The study focuses on the regional patterns of housing market development in Finland during the 1980s and 1990s. The time period thus covers the years of overheating in the late 1980s, the deep recession of the early 1990s and the early years of recovery. The study develops a simple empirical economic model of demand for housing services, housing prices and construction of new dwellings. The model is estimated with panel data on NUTS4-level regional units classified into four types of region: the metropolitan area of Helsinki, other large urban areas, other cities and rural areas.

The study is a part of the research project "The depression of the 1990s, the regional economic activity and the welfare state" coordinated by Professor Heikki A. Loikkanen. The project forms a part of a larger research programme on the Finnish economic crisis of the early 1990s organised and largely financed by the Academy of Finland. The study was conducted by Dr.Soc.Sc. Seppo Laakso from Urban Research Seppo Laakso. Pellervo Economic Research Institute warmly thanks Dr. Laakso and Professor Loikkanen for their intellectual contributions and the Academy of Finland for financial support.

Vesa Vihriälä

CONTENTS

1   INTRODUCTION

Boom, recession and housing markets

The severest economic crisis since the 1930s hit Finland in the beginning of 1990s. Real GDP declined by 11 per cent during three years 1991-93.[1] Unemployment rate rose from 3 % in 1990 to 16 % in 1993. The crisis had a major impact on all sectors of the economy and the whole society. Housing markets were one of the sectors dramatically influenced by the depression as well as the preceding overheating period in the second half of 1980s. The sky rocketing rise of housing prices in 1987-89 and their dramatic collapse in 1989-93 belong to the best-known events of the whole period. As a matter of fact, housing sector was an essential part of both the overheating and the depression.

The dramatic changes in Finnish housing markets during the boom and depression reflect several special features of property markets making the branch especially volatile and sensitive to economic fluctuations. The basic reason behind the instability and volatility of property markets is that the supply is very inelastic in the short run. For this reason the changes in demand cause sharp changes in property prices. As a consequence of strong price fluctuations also the construction of residential and office buildings as well as the demand and prices of materials and other construction inputs tend to fluctuate sharply. Expectations and asymmetric information are important characteristics of property markets. In addition, dwellings, buildings and lots have a central role as securities of loans. As far as policy variables are concerned, the availability of finance, the public subsidy systems and taxation of the housing sector affect prices (both asset values and user costs) and the functioning of housing markets. The demographic development affects housing markets, too. The change of the age and household structure of the population has strong effects on demand in the long run.

Migration has significant regional effects on housing markets, even in the short run. Migration is closely connected with the regional development of production and labour markets. Migrants cause an increase in the demand for housing in migration surplus regions. On the contrary, the demand decreases and over-supply may emerge in areas which loose population. Housing

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[1] These figures are based on revised National Accounts. According to earlier figures, the cumulative decline of GDP during 1991-93 was estimated to about 14 per cent.

conditions and costs both in the areas of origin and in potential target areas of migration are among factors affecting the mobility decisions of households.

A significant proportion of the wealth of Finnish households consists of the ownership of the dwellings in single family houses or in the form of owning shares of housing companies. Respectively, the majority of households' loans are housing loans. There are significant regional differences in Finland in type, size and quality distributions of dwellings. The level and development of housing prices differs between regions, as well. For these reasons there are big differences in the distribution of both wealth and debts of households, not only between socio-economic groups but also between regions. This affects essentially the real consumption possibilities and the welfare of households. The recession and the period of overheating before it changed significantly the distribution of households' wealth in Finland. Some households lost their wealth just because of unlucky timing in dwelling transactions. Some households were lucky and succeeded in increasing their wealth. Still, many households lived through the boom and recession without any significant effects on their wealth.

Housing consumption is a crucial part of the welfare of households. There are significant differences between household groups and regions with respect to housing consumption. When compared internationally, Finnish housing markets and institutions differ from most West-European countries. One of the most striking differences is that according to most indicators the average level of Finnish households' housing consumption lags clearly behind the average level of most EU-countries with same income level.

The development of real housing consumption of Finnish households has been much more stable than that of housing prices. For example, the average floor space of dwellings per person did not diminish even during the recession, only the growth rate slowed down.

Aims and contents of the report

The main interest in the project is the regional development of housing demand, supply and prices during the 1980s and 1990s. The focus is in the boom of late 1980s and especially in the recession of the 1990s.

The framework of the study is based on an economic approach to housing markets. The demand, supply and price developments at regional level are

modelled and estimated using econometric methods. As far as housing prices are concerned, dynamic theories and models are applied. The hypothesis of housing price bubbles - the tendency of housing prices to increase creating expectations of further increases - is tested using a dynamic, regional housing price model.

The study is based on empirical econometric analysis. The data used in analysis is regional panel data containing annual time series variables related to economic development and housing markets. The data is constructed at sub-regional level. There are 85 sub-regions in Finland, corresponding reasonably well to functional housing market areas, at least in the case of major urban areas. The time series used in the econometric analysis cover the years 1983-97. The reason for choosing this period is the availability of housing price data. However, for descriptive purposes, most variables in the data are available since the year 1970 or 1975. With respect to regional coverage and detail, the data is exceptionally good compared to most other studies on regional housing markets.

The report proceeds as follows. The theoretical framework and main features of national and regional housing markets are summarised in section 2. The regional, dynamic housing market model applied in the empirical part of the study is presented in section 3. A description of the construction of data and basic statistics of variables to be used in empirical analysis are presented in section 4. A summary of housing market developments at national and regional level is given in section 5. Results and comments of empirical econometric analysis is the topic of section 6. Interpretations and conclusions of results from the view-point of explaining the causes and consequences of the boom and depression in Finnish housing markets are dealt with in section 6. Finally, section 7 contains concluding remarks.

2 CYCLES, SHOCKS AND BUBBLES IN HOUSING MARKETS

Special features of housing markets and housing market research

Housing is a special good in many respects. There are several special characteristics connected with housing (see for example Arnott, 1987, and Goodman, 1989). Housing is a necessity for households. It is expensive and belongs to of the biggest items in the consumption expenditures of households. The location of housing is fixed. It is indivisible. Multidimensional heterogeneity is connected with housing, because it consists of several qualitative and quantitative characteristics. The markets are thin, in the sense that there may be only a few housing units or households of a certain type in the market. There are non-convexities in production, because the construction, demolition and renovation of housing cause discrete changes in supply.

There is also a possibility of asymmetric information, because the buyer and the seller do not necessarily have the same information on a housing unit in the market. Transaction costs, which consist among other things of search, removal, repair and broker costs, are high. Production times are long. Housing supply is very inelastic in the short run, and the volume of new residential buildings completed during one year is only 1-3 per cent of the whole stock. There are markets for second hand housing. As a matter of fact the largest supply potential is contained in the existing housing stock. Consequently, households act both as buyers and as sellers in the housing market. Finally, there are alternatives with respect to tenure of housing, and it is possible to choose between owning, renting and various mixed tenure forms.

An essential feature of housing markets is that they are basically local and consequently national housing markets are always an aggregation of several more or less separate regional housing markets. The supply of housing is bound to location, because houses and dwellings are normally not mobile. Also the demand comes basically from local households, in spite of the fact that migration also shifts demand between regions and even between countries. Still, the national and international economy influence local housing markets too, via general economic conditions and especially via financial markets.

None of the above-mentioned features is purely a characteristics of housing. Instead, these kinds of special features exist in the markets of other products,

as well. Still, all these features together make the analysis of housing markets somewhat different from the analysis of any other market.

The special features of housing markets have influenced economic research on housing markets. One mainstream of housing market research is concentrated on housing market structures at local, national or international level. Another mainstream topic is housing market development, also at local, national or international level. The developments of housing demand, supply and prices are typically analysed using econometric time series approach. The study of dynamic aspects of housing markets is an essential part of this research tradition. This is also the framework used in this study, although the division between studies on housing market developments and structures is not fully clear when regional panel data is used.

Basic relations of housing market analysis

Like most areas of economics, also housing market research deals with demand, supply and prices, and their interaction. In the following, these basic relations in housing market analysis are briefly summarised. More detailed descriptions on the topic are presented for example in Muth (1989), Arnott (1987), and Dispasquale and Wheaton (1997).

The concept "housing" refers in this study to the stream of housing services derived from housing capital. Demand for housing is based on the utility maximising behaviour of households. Within the standard framework, the demand for housing is a function of income, the user costs of housing, and various demographic and socio-economic factors. For renters the user cost of housing, i.e. the (flow) price for housing service per unit of time, is rent. For owner-occupiers, the user costs consists of various items which include costs of maintenance and repair and heating, interest on housing loans and return on own capital, and (expected) capital gains or losses. The asset price of housing refers to the price with which the ownership of housing units changes. The asset price of housing affects the respective user cost via the interest costs of external finance and the opportunity costs of invested capital.

The supply of housing services is based on housing stock. Construction of new housing units (flow supply) causes additions while demolition of old houses and depreciation cause deductions to the stock. Housing supply is rather inelastic in the short run. The annual net change in housing stock is typically 1-

3 percent. The supply of new housing units is based on profit maximising behaviour of firms. Consequently, the main factors explaining housing supply are housing prices and construction costs.

The basic relations of housing markets can be demonstrated by following equations:

(1)
$$H^D = f(Y,P,r,UC,D)$$
demand

(2)
$$H^S = g(P,C)$$
supply

where Y is real income, P is real housing price, r is real interest rate , UC is other items in the user cost of housing, D refers to demographic and other socio-economic factors and C is real construction cost.

In equilibrium,

(3)
$$H^D = H^S.$$

The equilibrium condition (3) can be solved for real housing prices,

$$P = h(Y,r,UC,D,C).$$

Equation (4) presents real housing prices as a function of fundamental factors of housing demand and supply.

In the literature, there are different specifications for housing demand, supply and price equations depending on the scope of the study, aggregation level and data available. Because the topic of this paper is to consider the reactions of housing markets over time, it is important to acknowledge the dynamic nature of housing markets. For this purpose, the specification of dynamic housing market models is dealt with next by summarising relevant literature.

Dynamics of housing market developments

Volatility is a typical feature of housing markets. Housing prices (asset price) vary significantly more over time than the prices of consumption goods. This is especially true in Finland, but applies to most other countries, as well. An interesting result of international comparisons is that Finland has been the most volatile OECD country with respect to real housing prices (e.g. Englund and Ioannides 1997 and Renaud, 1995). In addition to price volatility, the annual variation in housing construction has historically also been greater than average variation in investment activity. On the contrary, the short run development of real housing consumption is typically rather stable, at least at aggregate level.

One of the fundamental explanations for housing price volatility is the fact that housing supply is inelastic in the short run. Consequently, changes in demand due to external shocks cause big changes in equilibrium price. This can be demonstrated by a simple model in Figure 2.1 where the equilibrium price moves up (from p_0^* to p_1^*) as a consequence of a shift in the demand curve (D_0 -> D_1). The steeper the supply curve the bigger the price change which results from the given shift in demand. In the figure below, completely inelastic (stock) supply in the short run is assumed (vertical short run supply curves).

Figure 2.1: *Demand shift, supply and equilibrium price change in housing markets*
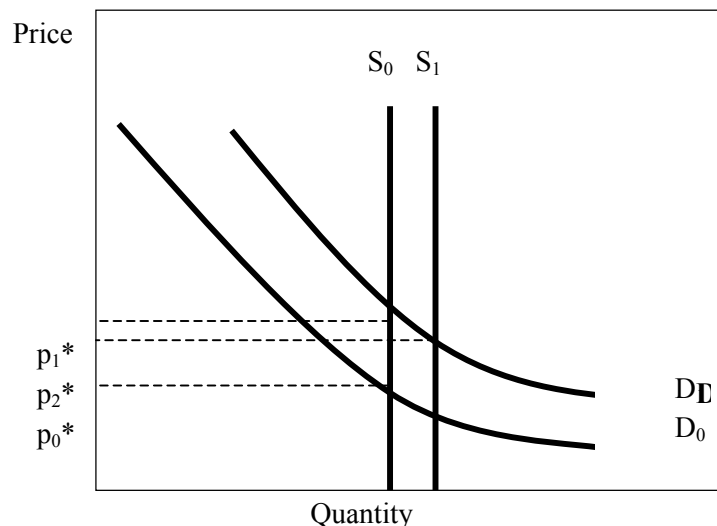
An external shock in housing demand may be caused by changes in income expectations, interest rates, availability of credit, housing subsidies, or by demographic factors like migration.

Housing producers use the price level changes of old housing stock as an indication of the expected market price development for new housing (flow supply). With price p_1^* housing starts will increase and, as production takes time, they will be in the market in the next period. Consequently, the stock supply adjusts from S_0 to S_1 to the changed demand and increased price and the equilibrium price decreases from the level to which it rose as a result of the initial demand shock ($p_1^* \longrightarrow p_2^*$).

The main reasons for the short run in-elasticity of housing supply include the long planning and construction times needed before new dwellings are in the market. Zoning and land use restrictions, lack of vacant land due to land ownership structure and missing incentives to sell vacant land to the market, and frictions in municipal land use planning and in the construction of public infrastructure are additional factors explaining the short run in-elasticity of supply.

The supplier sector (housing developers) typically consists of numerous independent firms observing the same market information, especially the price development in old housing stock, but they are unable to co-ordinate their supply decisions. Under these conditions, there is a possibility of excess production and consequent over-supply of new housing as a reaction to the increase in demand at some later point of time. This type of supply shock causes a decrease in housing price below the level at which all producers can cover their costs after the newly produced dwellings are in the market. Unwillingness to sell with too low prices (sticky prices downward) will manifests itself in increasing vacancy rates. This kind of situation is typical when housing demand stops increasing as expected, but irreversible production decisions previous periods were made assuming better demand conditions. Thus, the housing market may have a tendency to over-shoot in its reactions to changes in demand conditions.

In addition to demand side shocks, which most often are the origin of market adjustment, also shocks originating from the supply side are possible. Oil crises and changes in public subsidies for producers may function as sources of supply shocks.

The existence of demand and supply shocks creates cyclical variation in housing prices as a result of the mechanisms described above. Above, we also referred to the role of expectations as an explanation for housing price volatility. In addition to houses' and dwellings' role as the source of housing services, they are capital assets. Most of the wealth of households in Finland consists of the ownership of one-family houses and shares of housing condominiums[1]. The yield to owner of the asset consists of imputed net rent (in the case of owner occupied housing) or actual net rent (in the case of rental housing), and capital gains. Changing expectations concerning the future development of the yield from housing assets, especially the capital gains, is a crucial factor in explaining the volatility and cyclical development of housing prices, in addition to demand and supply shocks.

Housing price bubbles

Price movements generated in the market due to the self-fulfilling prophecies of market participants are often called "bubbles" to denote their dependence on events that are extraneous to the market. The idea that bubbles might exist is often traced to J. M. Keynes's (1936) description of an equity market as an environment in which speculators anticipate "what average opinion expects average opinion to be", rather than focusing on things fundamental to the market. (Flood and Hodrick, 1990.)

In the literature (e.g. Flood and Hodrick) a bubble is characterised as a certain type of deviation from equilibrium price based on fundamental factors. In the case of housing market, the market fundamental price is the equilibrium price based on income, employment, real interest rate etc. A deviation of the current market price of the asset from the value implied by market fundamentals can be called a bubble if it represents an expectation that the deviation will continue. In other words, the bubble is present if deviation growth can be anticipated by previous deviation growth. In several studies (e.g. Case and Schiller, 1990; Abraham and Henderschott, 1994) serially correlated

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[1] Approximately 70 percent of the housing stock in Finland is owner-occupied, 15 percent is owned by private investors and rented in free markets, and the rest, 15 % is social rental housing owned by municipalities and other non-profit-making institutions.

deviations of current prices from market fundamental prices are interpreted to be an indication of price bubbles.

After a bubble is born it grows larger and larger, and finally it likely creates an offsetting tendency to burst. This narrows the gap between the current price and market fundamental price, and may result in a decrease of real prices. It may also be the start for a new bubble towards the opposite direction.

According to Flood and Hodrick (1990) there is criticism against the theory of bubbles. Many researcher argue that empirical tests for bubbles are uninteresting because they can be ruled out by certain types of rational economic theories. Still, according to several studies – some of which are referred to in the next sub-section - it is a fruitful framework for explaining developments in housing markets.

Problems of housing market volatility

The strong volatility of housing markets, especially of housing prices, causes problems to households as consumers of housing services and to developers and constructors of new housing as housing suppliers. Strong fluctuations of housing prices increase risks connected with housing investments. A rapid increase of housing prices in a boom usually result in growth of indebtedness in the household sector. Price growth is especially problematic from the point of view of potential entrants to owner occupied housing sector. They are typically young households who do not have significant initial capital. Consequently they face the risk of too big loans compared with their income prospects. Most risks connected with price bubbles actualise after the bubble has burst and prices have started to go down. Along with declining asset values the wealth of households falls. Consequently, the collateral values of housing assets diminish. This affects the possibilities of households to get new loans to buy new houses or dwellings, or to spend for other consumption. Households may end up deeply involved in debt when the collateral value falls below the value of the loan. Sellers of housing assets suffer from capital losses if they bought the property when prices were high. Many households end up with traps of two houses or dwellings.

Price development in the existing housing stock is an important indicator for developers and constructors of new housing. Consequently price volatility causes strong fluctuations in the activity level of housing construction. It has

strong influence on the turnover and capacity use of developer and construction firms as well as on firms engaged in the manufacturing of construction materials and in other industries linked with construction.

Strong fluctuations of housing prices and construction volumes affect the whole economy for several reasons. First, changes of household sector's wealth due to fluctuations of asset prices strongly influences the consumption of households (e.g. Honkapohja and Koskela, 1999). Increasing housing and stock prices lead to consumption growth, and respectively, decreasing prices lead to declining consumption at the level of the national economy. Second, housing production is an important part of total investment in the economy. Third, housing prices also have an effect on inflation rate, although this relation is not especially strong in Finland (e.g. Bharot and Takala, 1998).

Empirical studies on housing market developments

Several theoretical and empirical models on housing market dynamics have been published in the literature of housing economics during the last decades. The research tradition and basic approaches on this topic are reviewed among others in articles of Arnott (1987), Muth (1989), and in several books, for example DiPasquale and Wheaton (1996) and Rothenberg, Galster, Butler and Pitkin (1991). In the following, a selection of Finnish and international studies are briefly surveyed. The idea is not to cover all the relevant literature, but rather to give an overview of various approaches and principal results.

The fluctuations of housing markets in Finland with have been analysed in several time series studies during 1980s and 1990s.

Korpinen (1989) modelled the dynamic development of housing prices and housing supply in Finland. In his model housing demand was explained by demographic factors, real interest rate, changes in housing supply and endogenous price expectations. The supply was modelled to depend on housing prices, construction costs and expectations concerning economic activity. He predicted in 1989 that real housing prices would decrease by 23 percent during the year 1990. Suoniemi (1991) continued Korpinen's work by developing the econometric specification and estimation of the model.

Salo (1990) analysed the demand for and supply of housing in Finland using time series data and methods. In the demand model the quantity of housing stock was explained by real income, user cost of housing, number of

households, and several indicators connected with financial markets and housing markets. Salo also estimated a simultaneous model for demand and supply representing long run equilibrium of housing markets at national level.

Kosonen (1995) analysed the dependence of housing prices in four Nordic countries (Finland, Sweden, Norway and Denmark) on various economic factors. Her model is based on the stock-flow model. She explained the variation of housing prices at annual level by disposal income of households, after tax real interest rate, unemployment rate and new loans to the household sector relative to GDP. Kosonen also described and analysed the boom and bust period 1986-93 in Nordic countries.

Bharot and Takala (1998) study the relationship between housing prices, consumer prices and other economic factors in Finland and Sweden using quarterly data. One of their findings is that in the long run housing prices and inflation tend to have similar growth rates in spite of the fact that in the short run housing prices exhibit large cycles. According to their results, changes in the general price level are transmitted into housing prices rather quickly, but inflation is surprisingly insensitive to housing prices. In addition to inflation, housing prices are significantly affected by interest rates, wages and unemployment rate.

Kuismanen, Laakso and Loikkanen (1998) examine the role of demographics on the housing market at local level. They estimate a time series model for housing prices and for the quantity of housing consumption using annual data from the Helsinki Metropolitan Area. According to their results, demographic demand (defined via age specific housing consumption parameters), real income, unemployment rate and user costs of housing explain significantly the variation of housing prices. Demographic demand and real income also explain variation in the quantity of housing consumption, while the effects of other factors are rather insignificant statistically.

One of the observations in Kosonen's study was that in spite of certain similarities, there are significant differences between the Nordic countries with respect to housing price developments. A common feature is that in all countries housing prices have been rather volatile since the beginning of 1970s. Still, a common Nordic housing market cycle could not be found. Especially, the years 1986-93 were very different in these countries. In Finland, both economic growth during 1986-89 was faster and the fall during 1990-93 more drastic than in other Nordic countries. In Sweden, the timing of boom and bust

was quite similar, but they were somewhat less dramatic in size. On the contrary, in Denmark and Norway housing price development was reasonably stable during these years, while they experienced price peaks earlier in 1980s.

The international links between national housing markets have been analysed in several studies, among others in Englund and Ioannides (1997), Renaud (1995), and Brunila and Suvanto (1998). All these studies show that in spite of the local and domestic nature of housing markets, they are closely linked to the international economy.

In many respects housing markets are basically local. The supply of housing is bound to location because the existing housing stock is not mobile. The developing and construction industries are typically domestic, and so far there has not been much international competition within this branch. The demand for housing services comes mainly from the local population in spite of the fact that migration shifts demand between regions and even between countries. On these grounds one would expect that national – and even regional – housing markets would function separately without much interaction between them. Still, there are important factors linking seemingly separate national housing markets. First, the fluctuations of economic activity are linked between countries due to international trade and financial markets. Consequently, the development of employment, income and inflation - basic factors affecting housing demand – are interrelated between countries. Second, financial markets are more and more international, especially after their deregulation took place in several countries during the 1980s. For this reason, interest rate developments are closely linked internationally. Real interest rate is one of the most important factors affecting both housing demand and the construction of new housing.

Englund and Ioannides (1997) study housing prices in fifteen OECD countries using panel data from the years 1970-92. They point out the dynamic nature of housing prices. In their model lagged values of housing prices are used as independent variables. According to their results, past values of housing prices explain significantly the future development of housing prices indicating cyclical price fluctuations around equilibrium prices. In addition, they include GDP growth, real interest rate and a demographic variable in their model as fundamental factors. Estimation results show that GDP growth and real interests are significant factors in explaining housing price developments while demographic factors are not. They also included country specific fixed

effects which did not turn out to be significant. According to their conclusions, there are clear similarities in housing prices cycles between countries. Still, they found only weak evidence on a common, international housing price cycle.

Renaud (1995) studied the international links between national housing markets from the viewpoint of the international real estate boom and crash at the end of 1980s and the beginning of 1990s. According to his view, the global real estate crash of 1990s is a new phenomenon in international economics. He points out that one of the dominant global factors behind the development in the second half of 1980s was the rapid asset price inflation in Japan together with Japanese foreign investment. This took place at the same time with capital market liberalisation and financial deregulation in several OECD countries. He notices that the country with highest volatility was Finland, a fact which - according to him - needs to be analysed and explained. He also points out the similarities of the developments between Finland, UK, Japan, Australia and Sweden, countries geographically totally separate (except Finland and Sweden). According to Renaud, the policy to handle the effects of the crash failed in most countries. Financial markets were liberalised without taking into account the consequences on real estate markets, while after the crash, policy actions in many countries made the development even worse. His conclusion is that improved policy is needed to handle asset price fluctuations in real estate markets. For this reason powerful policy instruments as well as better information on real estate markets are needed.

Jaffee (1994) studied the reasons and consequences of the Swedish real estate crisis. His study period covers the overheating phase in 1985-90 and the crash in 1991-93. His analysis is based on stock-flow-model. According to his model, the fundamental factors of housing markets are GDP (income) growth, real interest rates, regulation and deregulation of financial markets, tax rules of interest rates, and subsidies to the housing sector. Jaffee points out the starting point in 1980s: Sweden was one of the countries with the highest levels of subsidies to housing sector and the highest consumption of housing per capita compared with other industrialised countries. According to his analysis, the increase in housing prices and volume of construction in 1985-90 was purely based on the growth of fundamental factors (including deregulation of financial markets and credit growth). His view is that in Sweden there was no bubble in housing prices. The non-profit-making (almennyttiga) sector played a central

role in the growth of production of multi-family housing, especially outside biggest urban areas. The crash in price level in 1991-93 and the collapse of production in 1993 were also based on the change in fundamental factors, decline of GDP, growth of real interest rates, cut of subsidies, and changes of tax rules. As a consequence of the fall in demand there was overproduction in 1990-92 causing increasing vacancy rates, price decline, economic problems to house and real estate owners, bank crises etc. One of the essential features in Swedish housing market crisis was the structural and regional disequilibrium. Especially, there was an oversupply of multi-family housing, mainly owned by the non-profit-making sector.

In addition to his emprical analysis, Jaffee (1994) also presents the following policy recommendations to improve the functioning of Swedish housing markets: Subsidies for housing construction (interest rate subsidies) should be cut down and construction of new housing should be based on markets. The non-profit (almennyttiga) sector should be given a significantly less dominant role in housing markets. Consequently, new housing construction by this sector should shrink and privatisation of some parts of the old stock should be considered. Finally, Jaffee recommends to get rid of rent control.

Regional housing market analysis

As mentioned before, housing markets are basically local. Consequently, national housing markets consist of several more or less separate regional housing markets. The development of national and international economy and financial markets, especially interest rates, affect the development in all regions. To some degree this causes simultaneity on regional housing market developments. Still, there may be significant differences between regions. Employment, income and demographic developments – fundamental factors of housing demand – differ between regions. Areas where employment grows rapidly attract migrants from low-growth regions causing variation with respect to housing demand between regions. Conditions affecting supply may also differ regionally. The availability and price of land needed for housing construction vary. Vacant land is typically a scare and expensive resource in metropolitan areas. Planning rules and other land use policies may also vary affecting the availability and price of land. Construction costs may also be

affected by local factors like climate and geology, availability of labour and construction materials, transport distances, and the market situation of developers and the construction industry. All these factors may cause that the developments of housing markets differ significantly between regions.

Abraham and Hendershott (1994) study the differences between regions with respect to housing price developments. In their model the fundamental factors affecting housing prices are real income, employment, real interest rate, real construction costs – all factors which, in the U.S. case, vary between regions. These fundamental factors determine the long run equilibrium price level in each region. The most interesting feature in their paper is the specification of housing price dynamics. Their hypothesis is that, besides the fundamentals determining the long run price equilibrium, the dynamics causing variation around equilibrium may vary between regions. In their model, the dynamic part of the model is divided to two components. First, there is the tendency that price changes are related with previous price changes, this is the mechanism creating price bubbles. This component is taken into account by including lagged values of housing price in the model. Second, there is the tendency to burst of bubble. This component is specified in their model by measuring the gap between actual price and equilibrium price. More detailed description of the specification of this model is presented in the next section, because the same approach and specification is used in the econometric estimations of this study. Abraham and Hendershott estimate their regional dynamic model using regional data from USA for the years 1983-92. According to their results, the fundamental factors - real income, employment, real interest rate and real construction costs – affect regional housing prices significantly, as expected. In addition, the results indicate strong dynamic effects and significant regional differences in housing price developments. They find evidence that in USA there are local housing price bubbles remaining geographically restricted and they are not transmitted to other regions

Baffoe-Bonie (1998) points out the importance of macroeconomic shocks on regional housing markets. According to him external economic shocks – changes in the stock of money, interest rates, inflation rate, tax policy, employment, and income – cause dynamic cyclical effects on regional housing markets. In his model only employment and construction costs are considered as regional factors. He analyses the dynamic behaviour of housing prices and

housing market activity (number of houses sold) using VAR method and regional quarterly data from USA in the years 1973-94. According to his results, swings in housing prices and houses sold are significantly influenced by national and regional economic variables. Monetary policy affects significantly – via interest rates – regional housing markets. Employment and income also have a major impact on housing cycles. He found external shocks (changes in exogenous economic variables) causing dynamic effects for several periods. The results indicate that there are significant differences between regions with respect to the strength and duration of these effects. He also admits that economic variables alone cannot explain the fluctuations that occurred from 1973 to 1994.

3 SPECIFICATION OF THE REGIONAL HOUSING MARKET MODEL

The empirical analysis of Finnish regional housing markets is based on econometric models derived from the framework presented in the previous section.

Demand model

Housing demand refers in the following to the quantity of housing consumption from existing (occupied) housing stock. The derivation of the housing demand model is based on utility maximising behaviour of households. When aggregated at regional level, housing demand can be presented as a function of demographic demand component (based on size and structure of population), permanent income and user cost of housing consumption. The basic hypothesis is that the increase in demographic demand and permanent income affects housing demand positively while user cost influences it negatively.

In the empirical part of the study the following basic formula is used to estimate the housing demand model.

$$(1) \quad d \log Q_t = a_0 + a_1 d \log Y_t + a_2 d \log D_t + a_3 d \log UC_t + \varepsilon_t \,,$$

where Q is the quantity of housing consumption, Y is permanent real income, D is demographic demand, UC is user cost of housing, and ε is an error term with standard properties. Notation $d\log X_t$ means $\log X_t - \log X_{t-1}$ $(=\log(X_t/X_{t-1}))$.

In equation (1) user cost UC depends among other factors on housing price P which is endogenous as it depends on demand and supply. The rest of the independent variables can be considered as exogenous. The definition of variables used in subsequent empirical analysis as well as estimation methods are presented in the sub-section on estimation results.

Supply model

Housing supply refers in this part of the study to the quantity of housing stock. The stock changes annually due to construction of new housing, and demolition, conversion and depreciation of existing stock. In the (flow) supply

model the dependent variable is defined as the quantity of completed new housing units relative to the stock. Consequently, it is implicitly assumed that the effect of demolition and conversion is approximately a fixed proportion of stock. The effect of annual depreciation (and appreciation due to maintenance and renovation) is also neglected.

In the derivation of the supply (housing construction) model it is assumed that housing suppliers (developing and construction firms) aim to maximise their profits. Consequently the quantity of housing construction is a positive function of expected selling price of new housing units (indicated by the price level of existing stock P) and a negative function of construction costs and financing costs.

In the empirical part of the study the following basic formula is used to estimate the housing supply model.

$$(2) \quad \log S_t = b_0 + b_2 \log P_{t-1} + b_3 R_{t-1} + b_4 d \log CC_{t-1} + \omega_t .$$

In (2) S is the quantity of housing construction relative to stock, P is real housing price, R is real interest rate, CC is construction costs, and ω is an error term with standard properties. Because it takes normally about one year (at least) from the construction decision to the completion of a residential building all the independent variables are lagged.

Like in the case of the demand equation housing price P is endogenous in model (2) because it depends on demand and supply. The rest of the independent variables can be considered as exogenous. The definition of variables used in estimation as well as estimation methods are presented in the sub-section on estimation results.

Price model

One of the main features in Finnish housing markets in the period 1987-93 was the skyrocketing growth and dramatic crash of housing prices. The hypothesis of this study is that changes in fundamental factors do not alone explain the size of price fluctuations but there was also a price bubble followed by the burst of it. The approach and model of Abraham and Hendershott (1994) (A&H in the sequel) is applied in this study to test this hypothesis. The basic ideas and

results of A&H model are presented in the previous section. In this section the specification of the model is presented more formally.

In A&H model the growth in equilibrium real housing prices in a specific region or city is defined as a linear function of the growth in real construction costs, real income per working age adult, employment, and the change in real after-tax interest rates. The choice of fundamental factors is based on urban land market models of Capozza an Helsley (1989 and 1990). The variables used in the empirical part of this study to represent the fundamentals differ in some details from A&H model and are presented in the next section.

The growth in equilibrium real housing prices during period t, $d\log P^*_t$ (= $\log(P^*_t/P^*_{t-1})$ can be expressed as follows

$$(3) \quad d \log P^*_t = c_0 + \sum_{i=1}^{K} c_i d \log F_{it},$$

$dlogF_{it}$ being the change of the logarithm of fundamental factor i. With an "error term" θ_t reflecting adjustment dynamics - including bubbles - as well as random error, we have:

$$(4) \quad d \log P_t = d \log P^*_t + \theta_t$$

Regarding the adjustment dynamics, the error term is specified as

$$(5) \quad \theta_t = \lambda_0 + \lambda_1 d \log P_{t-1} + \lambda_2 (\log P^*_{t-1} - \log P_{t-1}) + \phi_t,$$

where $\log P^*_{t-1}$ - $\log P_{t-1}$ is the log difference between the equilibrium and actual real price **levels** in a certain region at the beginning of period t and ϕ_t is a random error.

Other things equal, the greater the real price change in the previous period or the equilibrium-actual price difference at the beginning of the period, the larger will be the actual price change during the period. For λ_1 positive, the first component acts to perpetrate growth. The second component, for λ_2 positive, captures the tendency of the bubble to eventually burst. Substituting equations (1) and (3) to equation (2) real price change can be expressed as a function of fundamental factors and dynamic components:

$$(6) \quad d \log P_t = (c_0 + \lambda_0) + \sum_{i=1}^{K} c_i d \log F_{it} + \lambda_1 d \log P_{t-1} + \lambda_2 (\log P^*_{t-1} - \log P_{t-1}) + \phi_t .$$

The econometric difficulty is that equation (4) cannot be estimated without knowing P^* which itself depends on the estimates from (4). A&H suggest that this problem can be solved by estimating first (4) without the λ_2 term. An initial proxy for can then be calculated and cumulated over time to obtain a first-pass time series on P^*_{t-1} for each region. By iterating this process a few times one can get reasonably accurate estimates for P^*. According to A&H, in their case three iterations are required in a normal case.

4   DATA OF THE EMPIRICAL STUDY

Annual panel data at sub-regional level

The data used in this study is regional panel data. It contains annual time series data on demographic factors, economic development, labour markets and housing markets at sub-regional level. There are 85 sub-regions in Finland, their average population being about 61000. Each sub-region consists of 2-17 municipalities. There are big differences between sub-regions with respect to size, economic structure and urbanisation. The biggest sub-region is the Helsinki region with a population of 1.17 million people while the smallest one - Föglö - has only 2 400 inhabitants.

Following the definition of Vartiainen and Antikainen (1998) 35 of the 85 sub-regions can be considered as urban areas. They defined the main urban areas in Finland using several functional and economic criteria. The total population of urban sub-regions is 4 million, 77 percent of Finland's total population in 1999. The rest of the regions are more or less rural. The biggest urban sub-regions represent reasonably well functional housing market areas. Still, as far as most middle-sized and small towns are concerned, the real functional housing marker area around the centre town is significantly smaller than the respective sub-region which usually contains also several purely rural municipalities. Rural sub-regions cannot normally be considered as unified housing market areas but rather as geographically defined group of rural municipalities each of them having their own local housing market. With these reservations the data can be considered to represent local housing markets.

Variables

The data contains the following variables (years and data sources in parenthesis):

Demographic variables:
- population (1970-99, end of year; data source: Statistics Finland, population statistics)
- net migration (1971-99; data source: Statistics Finland, population statistics)

- population of age group 20-29 years (1975-99, end of year; data source: Statistics Finland, population statistics)
- number of households (1970, 1975, 1980, 1985-98, end of year; data source: Statistics Finland, Census 1970-80, population statistics 1985-98)

- Labour market and income variables:
- number of jobs (1970, 1975, 1980, 1985, 1987-97, end of year; data source: Statistics Finland, census 1970-85, employment statistics 1987-97)
- unemployment rate (1975-98, average of year; data source: Ministry of Labour, unemployment statistics)
- annual gross taxable income per income receiver (1977-97; data source: Statistics Finland, income statistics)

- Housing market variables:
- floor space (m^2) of total housing stock (1980, 1985, 1987-97, end of year; data source: Statistics Finland, census 1980-85, housing statistics 1987-97)
- floor space (m^2) of permanently occupied housing stock (1980, 1985, 1987-97, end of year; data source: Statistics Finland, census 1980-85, housing statistics 1987-97)
- floor space (m^2) of vacant or temporarily occupied housing stock (1980, 1985, 1987-97, end of year; data source: Statistics Finland, census 1980-85, housing statistics 1987-97)
- floor space (m^2) of completed new housing units (1980-97; data source: Statistics Finland, construction statistics)
- average housing price of sold dwellings, FIM/m^2, (1983-98; data source: Statistics Finland, housing price statistics; see a detailed description below)
- housing price index, 1983=100 for each region (1983-98; data source: Statistics Finland, housing price statistics; see a detailed description below)

- National level economic variables:
- consumer price index (1961-98; data source: Statistics Finland, price statistics)
- construction cost index (1961-98; data source: Statistics Finland, price statistics)
- housing loan stock from banks to households, mill. FIM (1961-97 end of year; data source: Statistics Finland, loan statistics)

- average lending interest rate of deposit banks (1961-97; data source: Salo (1990)/Bank of Finland 1961-88, Statistics Finland, financial statistics 1989-97)
- real after tax interest rate of housing loans (1961-97; estimated by the author using average interest rates, consumer price index, marginal income tax rates and deduction rules of the interest rates of housing loans)
- housing price index (1961-98; data source: Salo (1990) 1961-69, Statistics Finland, housing price statistics 1970-98)
- housing rent index (1961-98; data source: Statistics Finland, housing rent statistics)
- Demographic, economic and housing market variables are included in the data set at sub-regional level while price indices, interest rates and housing loan variables are available only at national level. As a matter of fact, there are regional differences with respect to price development as well as interest rates and availability of housing loans. Still, from the point of view of this study it can be assumed that regional differences with respect to these factors are marginal and can be ignored.
- Some of the variables were only available at five years intervals from Census years until the year 1985. In these cases the missing years between the Census years were interpolated.
- Housing price, income and construction cost variables were deflated using consumer price index prior their use in descriptive and econometric analyses.

Construction of regional housing price data

Housing price data at sub-regional level has been constructed especially for the purposes of this study. It is based on the quarterly housing price index data Statistics Finland has produced since 1983. Its data source is information on dwelling transactions completed with the help of major real estate agencies all over Finland. The data covers second hand dwellings in housing corporations. Consequently most sales of one-family houses are excluded.

Using this data Statistics Finland constructs a quarterly hedonic housing price index and average housing price for 17 major cities and towns[2], 3

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[2] In addition, there is a sub-division with respective indices for the Helsinki region

regional groups of smaller towns and 3 regional groups of other municipalities. Sub-regional housing price time series were constructed from this data. Annual housing price of a sub-region is defined as the weighted average of quarterly housing prices of major cities and towns belonging to the respective sub-region and housing prices of other towns and other municipalities belonging to the same regional group. Population sizes at municipality level were used as weights.

Basic statistics

Basic statistics of the key variables from the panel data are included in table 4.1. Net migration, population size of 20-29 years old and households are presented relative to population. Housing prices, income and construction prices are in real terms. Housing construction is presented relative to existing housing stock.

Table 4.1: Basic non-weighted statistics of selected variables from the sub-region level panel data, years 1983-97

	Mean	Std	Min	Median	Max
Variables at sub-regional level (n=1190)					
Population (1000)	58.9	117	2.4	33.1	1140
Share of 20-29 years old population, %	13.1	2.0	7.4	13.2	19.6
Population/households	2.6	0.2	2.2	2.6	3.6
Net migration / population, %	-0.2	0.6	-2.0	-0.2	2.0
Real per capita income, 1000 FIM at 1996 prices	71.8	10.7	44.3	70.7	115.2
Unemployment rate, %	11.7	7.1	0.6	9.4	29.6
Housing stock floor space / population, m2	32.7	3.3	24.5	32.7	42.4
Vacancy rate, % of housing stock floor space	6.3	1.6	2.5	6.1	12.2
Completed dwellings, % of housing stock floor space	2.0	1.0	0.2	2.0	5.3
Real housing price, FIM/m2 at 1996 prices	4999	983	3651	4732	13165
Real housing price, index 1983=100	109.2	19.0	80.0	106.0	182.6
Variables at national level (n=14)					
Real construction costs, index 1983=100	99.5	2.7	95.6	99.3	104.5
Real value of housing loan stock, index 1983=100	166.3	36.7	100.0	180.1	199.8
Real interest rate, %	5.6	2.1	1.3	5.4	9.9
Real after tax interest rate, %	1.0	2.9	-4.2	0.2	5.2

Regional classification

For descriptive purposes sub-regions are divided into four groups, each representing roughly one quarter of the country's population:

- the Helsinki Region (population 1.17 million (1999))
- other major urban areas (Tampere, Turku, Oulu, Jyväskylä, Lahti, Pori, Kuopio; total population 1.27 million)
- middle-sized and small urban areas (27 sub-regions; total population 1.57 million)
- mainly rural areas (50 sub-regions; total population 1.17 million).

This classification is used in the description of regional developments of housing markets and economy in the following section, as well as in the econometric models of section 6.

The differences of regional groups with respect to demographic, economic and housing market structures are demonstrated in table 4.2. The classification divides the country with respect to the degree of urbanisation. The Helsinki region is the most urban and rural areas the least urban group. There is a clear pattern with respect to most variables following the degree of urbanisation. The proportion of young adults increases while the average household size decreases with respect to the degree of urbanisation. Net migration is clearly positive in the Helsinki area and negative in rural areas. Average income is highest and unemployment rate lowest in Helsinki while the opposite rankings apply to rural areas. As far as housing markets are concerned the housing stock per population rate as well as the vacancy rate is lowest in Helsinki. On the other hand, the housing price level and construction of new dwellings relative to housing stock are highest in Helsinki and lowest in rural areas.

Table 4.2: Averages of selected variables by regional groups in 1983-97 (weighted by population)

	Country total	Helsinki region	Other major urban areas	Mid.s. &small urban areas	Rural areas
Share of 20-29 years old population, %	14.2	16.1	14.8	13.7	12.7
Population/households	2.5	2.3	2.4	2.5	2.7
Net migration / population, %	0.1	0.6	0.3	-0.1	-0.3
Real per capita income, 1000 FIM at 1996 prices	82	104	84	78	68
Unemployment rate, %	10.8	7.5	11.9	11.4	12.0
Housing stock floor space / population, m2	32.3	31.2	32.3	32.8	32.6
Vacancy rate, % of housing stock floor space	5.8	4.9	5.5	5.9	6.5
Completed dwellings, % of housing stock floor space	2.1	2.4	2.2	2.0	1.9
Real housing price, FIM/m2 at 1996 prices	5746	8336	5306	5020	4906

5 HOUSING MARKET DEVELOPMENTS IN FINLAND

The main features of housing market developments in Finland during the last few decades, and especially during the boom and bust years of 1980s and 1990s, are described in this section. It is based on annual statistical data concerning housing demand and supply, housing prices and rents, and financial market indicators. In addition to developments at national level special emphasis is given to regional differences. In most cases the variation in regional development is demonstrated with time series figures including the country as a whole in addition to four groups of regions defined in the previous section.

Population development

Housing services are consumed by households. Consequently, the size and structure of population and number of households are among the basic factors determining housing demand both nationally and regionally. It should be noted that migration causes significantly greater fluctuations in the size and structure of population at regional than at national level. The relation between demographics and housing markets is analysed among others by Mankiw and Weil (1989). Kuismanen, Laakso and Loikkanen (1999) applied their approach to study the effect of demographic factors on housing demand at local level, in the Helsinki metropolitan area. Their results show that demographic variables are the main factors in explaining changes in housing prices and housing demand over time.

The population size changes because of births, deaths and migration. Finnish population has grown during the last decades, except a few years of active emigration in 1960s and 1970s. Still, at national level the annual growth rate of population has been rather modest for several years. The average annual increase of Finland's population was 0.4 % during the period 1983-97. On the contrary, there has been a lot of variation between Finnish regions with respect to population development, as demonstrated in figure 5.1. The main reason for this is migration, the basic trend for several decades having been mobility to the Helsinki region and other major urban areas from the countryside and

smaller towns. In addition to migration there is significant variation between regions with respect to birth and death rates due to differences in age structures as well as age specific fertility and mortality rates.

Regional population changes – especially migration - have a clear trend related with economic fluctuations. After the years of "grand migration" from mid 1960s to the beginning of 1970s, migration between regions stabilised in Finland in the first half of 1970s. During the 1980s - after the oil crisis recession - population growth in the Helsinki region, like in other major urban areas, accelerated due to rapid employment and income growth in these areas. Rural areas started to suffer from population loss in mid 1980s, respectively. The population trend changed in 1988-89: growth in the Helsinki area and decline in the county side areas slowed down. It must be noted that this happened much earlier than the economic recession started in Finland. In the Helsinki region population growth started to accelerate again quite soon, during the time when the recession was at its deepest in 1991-93. The main reason for this was the expanding immigration from the former Soviet Union starting in 1991. From the year 1994 on, according to statistics, the migration surplus Helsinki and other major urban regions from the rest of Finland started to increase again. This was partly due to the new home municipality law coming into effect in 1994 which allowed students to be registered as residents of the municipality where they studied, although their parents home was elsewhere. In the rural areas years 1988-92 were quite a stable period from the viewpoint of population development, while since the year 1993 their population loss has increased year by year.

*Figure 5.1:* Annual population change (%) by region type in 1971-99
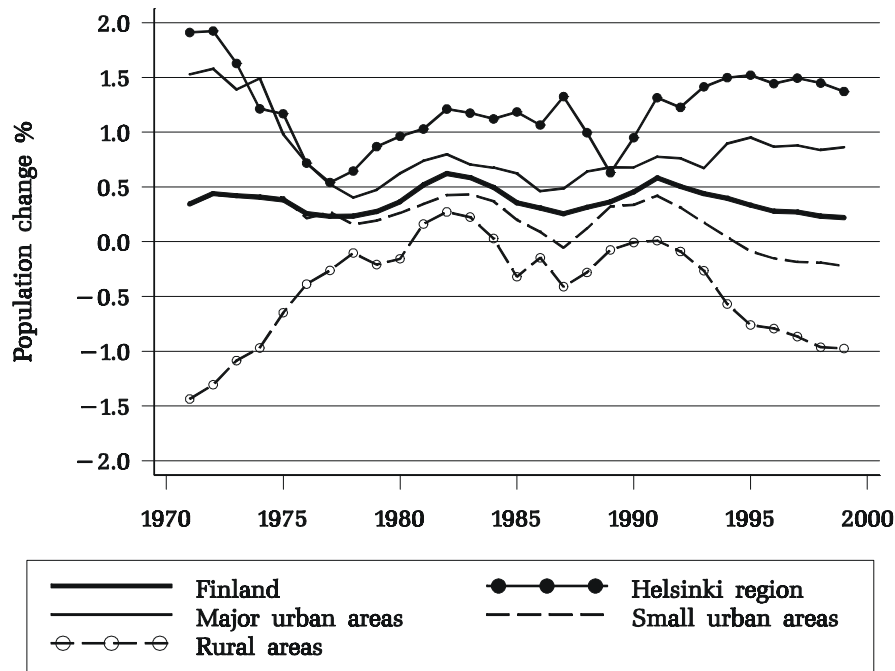
In addition to population size, its age structure affects significantly housing demand. In fact, this is the main point in the papers by Mankiw and Weil (1989) and by Kuismanen, Laakso and Loikkanen (1999) (K&L&L hereafter). Household formation, income level and housing preferences are all related with age. According to the estimation results of K&L&L from the Helsinki Metropolitan Area housing consumption per capita with respect to age increases most rapidly within the age group 20-29 years. After 30 years the consumption continues to grow up till the age of 80s but at a slower growth rate. Unlike in the USA, Canada or Sweden housing consumption in Finland – at least in the Helsinki Metropolitan Area – does not turn to a decline at middle age years. Still, from the viewpoint of housing markets, the size of the age group 20-29 years old has a key role in housing markets, because at that age mobility is high and housing consumption increases fastest.

The proportion of the age group 20-29 years was highest in Finland in mid-1970s because the big generation born after the war belonged then to this

group. Figure 5.2 shows that the share of 20-29 years old population has declined monotonically since mid-1970s due to continuously smaller generations born after mid 1950s. Migration causes polarisation between regions with respect to age structure. The reason is that the majority of migrants are young adults. Consequently, the proportion of the age group 20-29 is significantly higher in the migration surplus areas - in the Helsinki Region and other main urban areas - than in rural and smaller urban areas suffering from migration deficit. The cap between regions has increased since the end of 1970s.

Figure 5.2: *Proportion (%) of the age group 20-29 of population by region type in 1975-98*
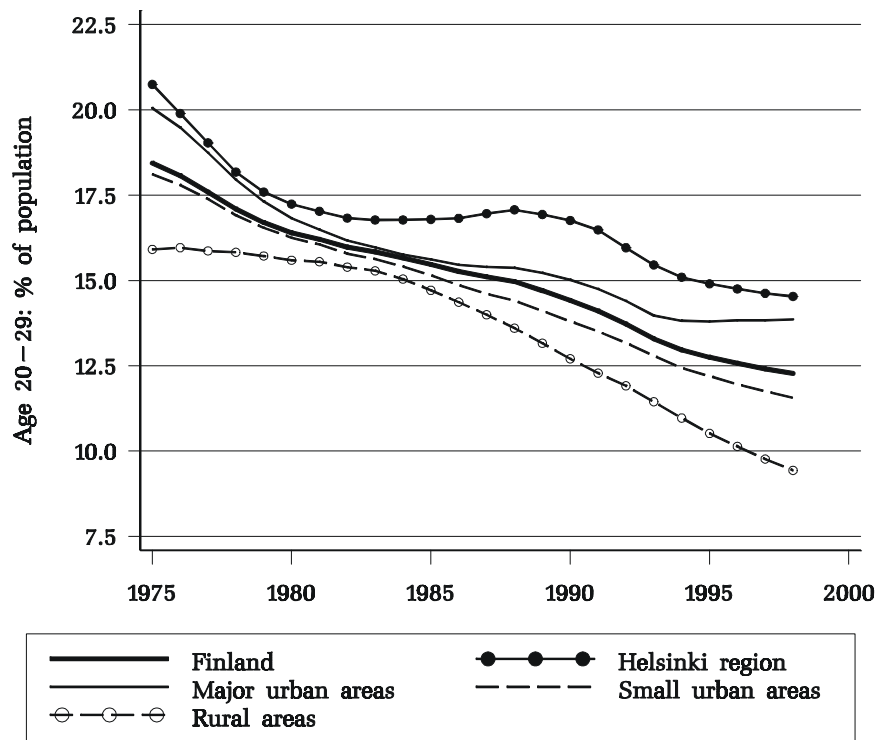

Besides population size and its age structure also household formation affects housing demand. Household's size and age distribution are closely related with the age structure of population. In addition, fertility and mortality, preferences

and habits concerning family formation, and the number of children affect household patterns. Housing market conditions may also influence household formation.

The long-lasting trend in Finland has been that the number of households has increased faster than the population and as a consequence, the average size of households has declined. The boom and bust years of housing markets in 1987-95 did not change this trend in any way. There are more households relative to population in the Helsinki Region and other major urban areas than in smaller urban areas and especially in the countryside. Still, the gap has decreased to some degree, especially in 1970s and the first part of 1980s, but also during the 1990s.

Figure 5.3: Households per 100 inhabitants by region type in 1970-98
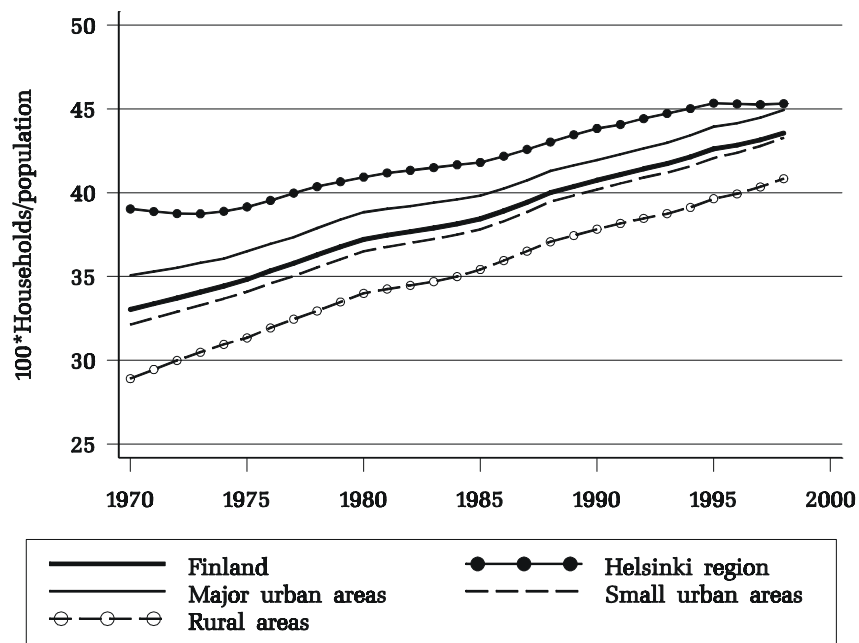
Labour markets

Population development and housing demand at regional level are closely related to local labour markets. Employment and unemployment are important factors in explaining migration between areas. They also affect significantly actual and expected income of households, which in turn influence both housing demand and the price of housing.

According to the figure 5.4 there has been a great difference between the Helsinki region and the rest of the country with respect to job growth during the 1980s and after the recession of 1990s. Annual job growth rate in the Helsinki region was 2-3 percent points higher than the average rate in the whole country for most of the 1980s. The gap was especially big in 1986-87. Rural areas lagged behind other areas, respectively. The magnitude of relative job loss during the recession in 1991-93 was approximately the same in all region types. On the contrary, after that period job growth has been significantly stronger in the Helsinki region and other major urban areas than in the rest of the country, especially the rural areas.

Unemployment rates are determined by the developments of employment and labour supply, the last one being strongly affected by migration. Figure 5.5 shows that the trend of unemployment rate is quite similar in all region types. Still, during the whole period there has been a significant difference in the level of unemployment rate. In the Helsinki region the level has been systematically 3-5 percentage points lower than the national average both before, during and after the recession. Unemployment rate in rural areas was systematically above the national average during the 1970s and 1980s, but the gap almost disappeared during the recession. On the contrary, in major urban areas (other than Helsinki), unemployment rate grew above the level of other region types during the recession.

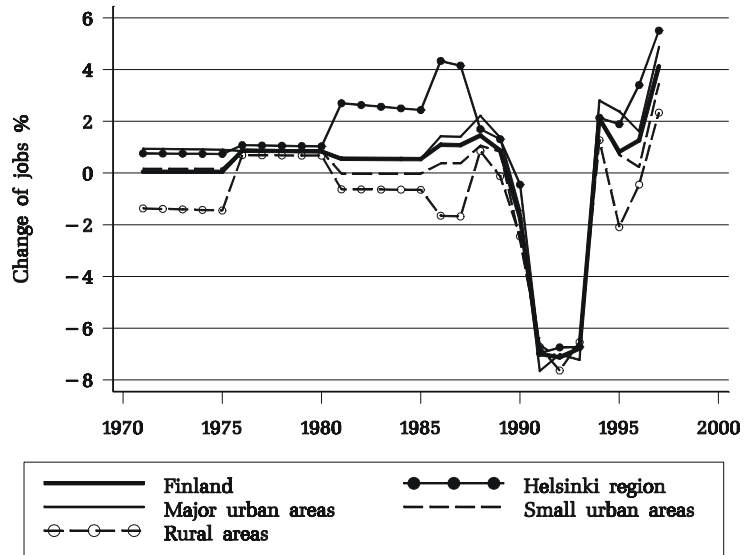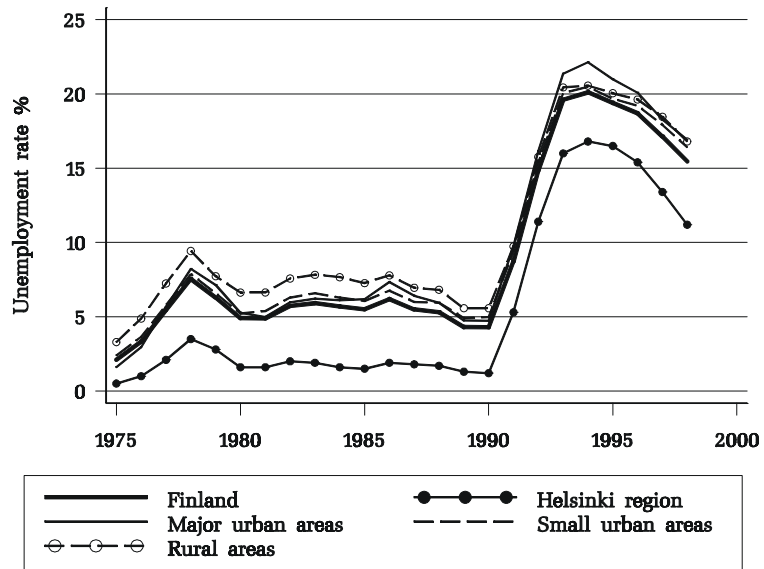*Figure 5.4: Annual change of jobs (%) by region type in 1971-97[3]*

Figure 5.5: Unemployment rate (%) by region type in 1975-98

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[3] Note: 1970-85 annual averages of five-year periods.

Housing consumption

The quantity of housing consumption is measured in this study by the total floor space of occupied housing stock (total stock minus vacant and unused stock). This definition of housing stock is a simplification made for practical reasons (availability of data). Consequently, it is implicitly assumed that housing stock is homogenous and variation with respect to quality and location manifested itself in unit price differences is not taken into account.

The growth rate of housing consumption was at its highest in Finland in the first part of 1970s. Since then the growth rate has gradually declined. The occupied housing stock increased by about 2.5 % annually in the first half of 1980s. It is interesting to note that during the overheating period of housing markets in 1987-89 housing consumption growth did not accelerate, but rather it slowed down. There was a peak up in the year 1990 when exceptionally big number, 65 000, of new dwellings were completed. During the recession years in 1991-93 housing consumption did not turn to decline like the consumption of most durable goods. On the contrary, growth of housing consumption continued at quite a stable rate of 2 percent per year. As late as in 1994, when the GDP and employment started to grow again, the growth rate of housing consumption declined to an exceptionally low level of 1.2-1.4 % per year.

The growth rate of housing consumption has been higher in the Helsinki Region and other major urban areas than in the rest of the country. According to figure 5.6 the gap between region types has increased significantly during the 1990s.

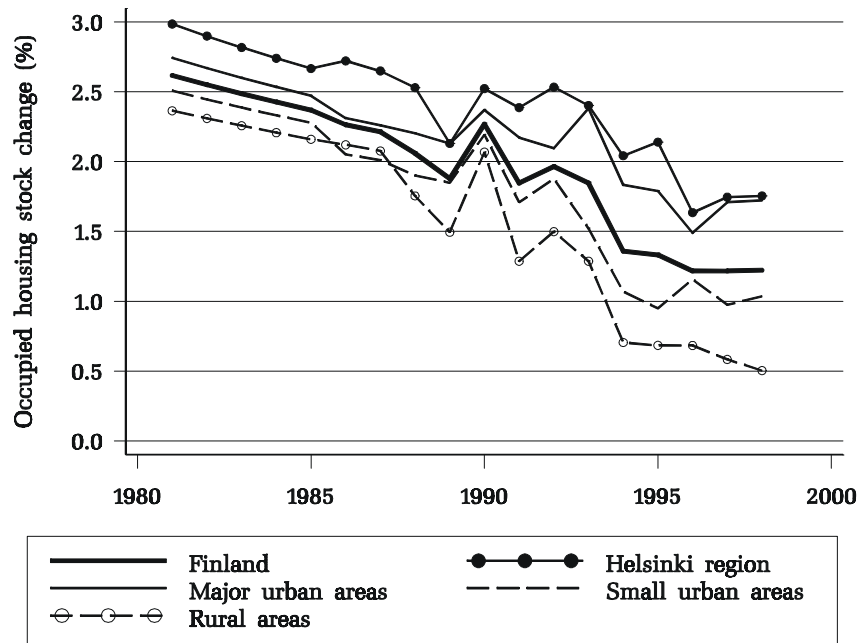*Figure 5.6:* Change (%) of occupied housing stock by region type in 1980-98

Figure 5.7 confirms that the trend in housing consumption growth in Finland, when measured by floor space per capita, neither changed significantly during the overheating period nor during the recession. Regional development with respect to floor space per capita is quite interesting. In the Helsinki region this indicator was at the same level as in the whole country in the beginning of 1980s. Still, the growth rate in the Helsinki region has been lower than in elsewhere – especially in 1990s – and consequently the Helsinki region now lags behind the rest of the country with respect to per capita housing consumption. On the contrary, the rural sub-regions have exceeded the average level of the whole country. Paradoxically, housing consumption per capita is now at significantly higher level in the poorest regions than in the richest region. This development can be partly explained by migration: One consequence of migration deficit in rural areas is the increase in living space among the remaining, smaller households. At the same time, supply restrictions limit housing consumption growth, partly generated by migration surplus, especially in the Helsinki region. An interesting detail is that also the gap

between the Helsinki region and other major urban areas has grown, in spite of the fact that both region groups have been migration surplus areas. This indicates the special nature of supply restrictions in the housing market of the Helsinki region.

Figure 5.7 Occupied floor space (m^2) per capita by region type in 1980-98
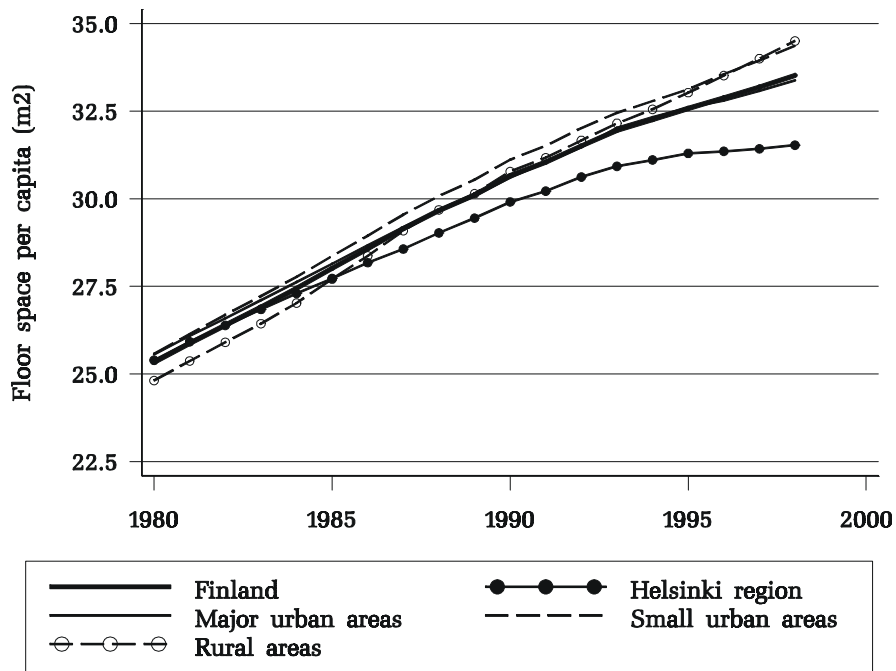
Housing supply

The supply of housing services is based on housing stock. Construction of new dwellings cause addition to the stock and demolition of old houses cause deduction. A certain part of the stock is normally vacant. The normal processes of mobility between dwellings cause vacancies, because dwellings are typically vacant a certain period after old inhabitants have moved out or - in the case of new housing - after new dwellings have been completed, and before new inhabitants have moved in. According to Gabriel (1999) the normal level of vacancies in the cities of USA is 4-5 percent of housing stock, depending on mobility rates and certain other factors. In addition to "normal vacancy rate

level", permanent or temporarily disequilibrium in the housing market – which normally varies between regions, locations and housing segments – influences the actual level of vacancy rate. Vacant dwellings also act as a buffer for housing demand fluctuations.

Housing construction relative to housing stock was around 3 percent in Finland in the beginning of 1980s. The trend was downwards until the boom years of housing markets in the second half of 1980s. Following rising housing prices a lot of new housing construction was started in 1998-89 causing overheating in the construction industry. Respectively, there was a peak in the volume of completed dwellings in 1989-90. After this boom the volume of housing construction declined sharply until the year 1996. New growth started in all region groups as late as in 1997. The time profile of housing construction during the boom and bust years is quite similar in all region groups. Housing production relative to stock was roughly at the same level in all region groups during the 1980s, except for Helsinki with a slightly higher level during the boom years. The regional gap widened during and after the recession.

Figure 5.8: *Total floor space of completed dwellings relative to housing stock (%) by region type in 1980-98*
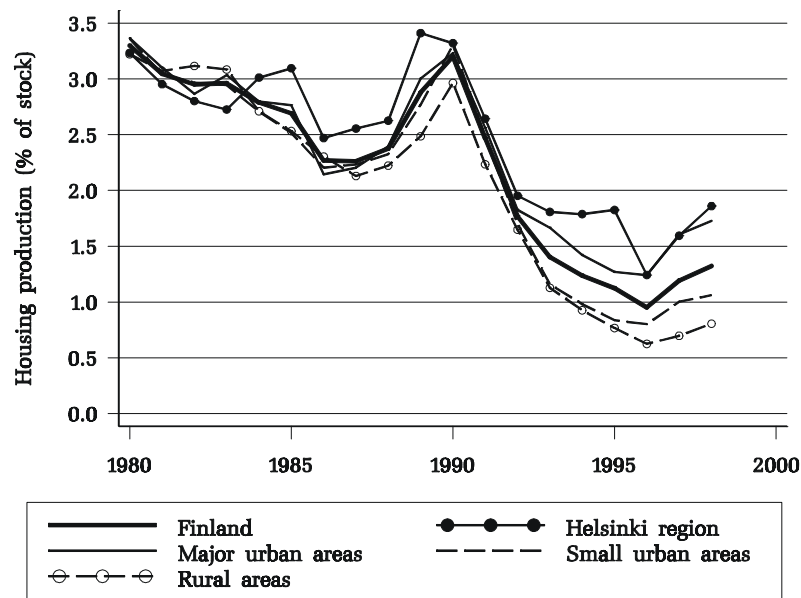
The vacancy rate of housing stock reflects the lack of balance between demand and supply of housing. Unfortunately the data concerning vacancy rates are not fully reliable, especially before the year 1987. The definitions and methods used in housing statistics have been changed several times and consequently the figures are not fully comparable between years, especially during 1980-87. In addition to pure vacancies the category includes temporarily occupied (typically by students) dwellings, as well a small proportion of non-existing units (demolished houses or dwellings merged with adjacent ones). Still, the statistics give reasonably correct information about trends and regional differences of vacancy rates, at least since the year 1987, in spite of the fact that there may be a significant error margin in the level.

In 1987 – at the beginning of the housing market boom – vacancy rates were reasonably low[4] in Finland, especially in the Helsinki Region. There was a sharp increase during the years 1998-91, due to increased housing production. After the production peak vacancy rates started to decline gradually. The trend was quite similar in all region groups until the year 1991, and the difference in vacancy rate levels between Helsinki and the rural areas was continuously about one percent point. After 1991, the trend has been totally different. In the Helsinki region the share of vacant dwellings has declined sharply while in the rural areas vacancy rates have continued to increase to a historically high level. The upward turn in 1998 is probably due to the increase in temporarily occupied rather than vacant dwellings.

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[4] In this study the calculation of vacancy rate is based on floor space instead of number of housing units. Consequently the rates are approximately 2 percent point lower than they would be if numbers of units were used because of significant difference in size distribution between vacant units and the whole stock.

Figure 5.9: *Total floor space of vacant and temporarily occupied dwellings relative to housing stock (%) by region types in 1980-98*
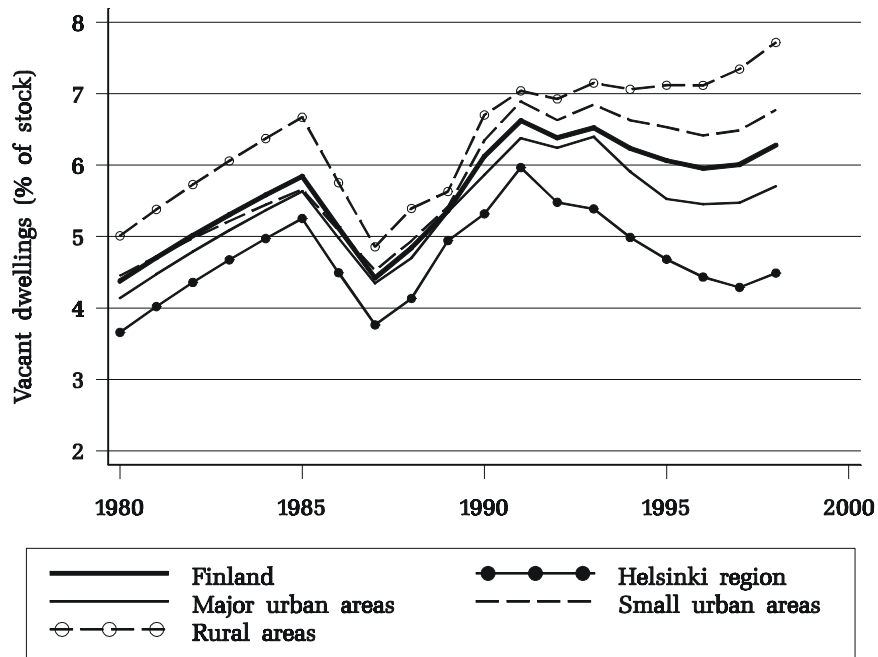
Housing prices and rents

Housing prices have been extremely volatile during the last decades as can be seen in figure 5.10. Two big cycles can be noticed since 1960[5]. Real housing prices rose almost continuously from 1960 to 1974. The increase was exceptionally rapid in the years 1973-74. After this price peak real prices declined sharply until 1980. During this period the Finnish economy experienced a recession which followed the oil crisis. In must be noted that nominal housing prices did not decline in the second half of 1970s but the fall in real prices was based on rapid inflation. Housing prices started to increase again in 1979. After a quiet period in 1985-86 real prices started to sky rocket during the second quarter of 1987. The growth continued for about two years.

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[5] Korpinen (1989) presents a table on price development in the inner city of Helsinki in 1947-69. According to this data real housing prices rose approximately by 140 % from 1947 to 1960.

Real housing prices rose by 60 % and nominal prices by 74 % from the first quarter of 1987 to the first quarter of 1989. Real prices reached their peak during the first quarter of 1989 and started to fall thereafter. They declined almost to a half of their peak value, reaching their bottom in the first quarter of 1993. The new growth of real housing prices started in the beginning of year 1996.

The long run development of real rents is totally different from that of real housing prices (figure 5.10). Real rents declined in Finland continuously from the first half of 1960s to the end of 1980s. The rent level in 1988 was less than 60 percent of the 1962 level in real terms. Even during the overheating periods of housing prices in 1973-74 and 1987-89 real rents did not increase. The main reason for this development was rent control being in effect in various forms most of the time during this period. There was a uncontrolled period for a few years in 1960s lasting until 1967. Thereafter, rent control (or rent regulation) prevailed until it was released in several stages during 1992-95. Real rents started to increase during the recession in 1991. At the same time, the supply of privately owned rental dwellings started to grow as well, after the decline of several decades. The growth of real rents has continued at least until 1999.

Figure 5.10: *Real housing prices and rents in Finland 1960-99, index 1983=100*
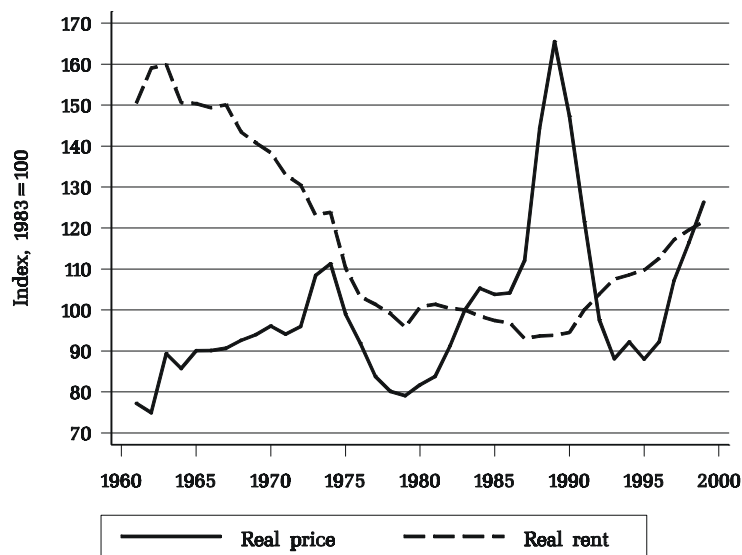
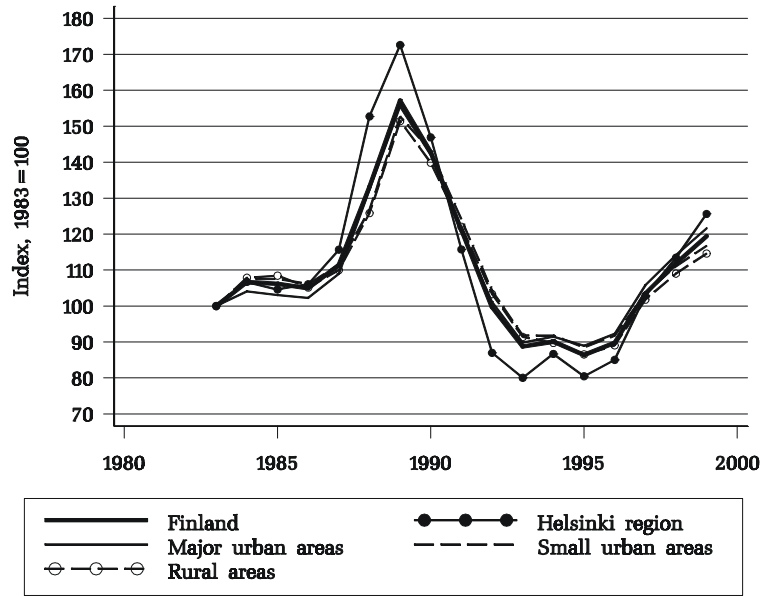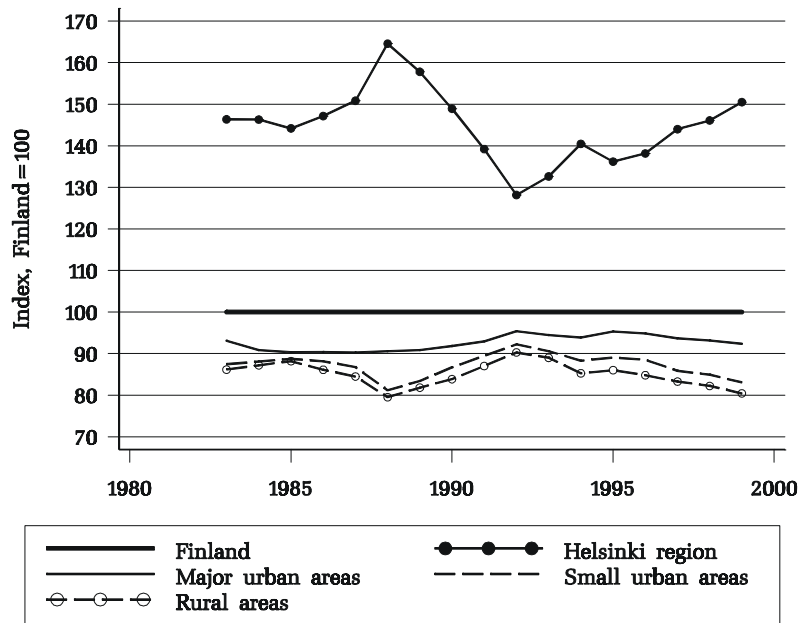*Figure 5.11: Real housing prices by region type in 1983-99, index 1983=100*

Figure 5.12: Relative housing prices by region type in 1983-99, Finland=100

Regional differences of housing price developments are demonstrated in figure 5.11. The trend in the real price curve is very similar in all region types. The price peak in 1987-89 like the collapse in 1990-94 was experienced in all regions in Finland. Even the timing of major changes is similar. As a matter of fact, one can find almost no difference in housing price development between major urban areas, smaller urban areas and rural areas, in spite of the fact that these region groups are very different with respect to population and economic developments. Still, there is a clear difference between the Helsinki region and the rest of the country during the bust and boom times: The relative price peak 1987-89 was higher and the drop after the peak was deeper in the Helsinki Region than in other regions.

Differences in relative price level can be seen in figure 5.12. The relative gap between the Helsinki region and other areas, especially smaller urban and rural areas widened during 1986-88 when prices grew faster in Helsinki than elsewhere. The gap narrowed significantly in 1989-92. One consequence of the recession was that the regional differences in housing price levels shrank. From 1993 on regional price gaps has widened again.

Financial markets and taxation

Financial markets were liberalised in several stages in Finland like in many other Western countries during the second half of 1980s. The liberalisation of financial markets had a major impact on Finnish housing markets (see Koskela, Loikkanen and Virén (1992) and Kosonen (1995)). The previous credit rationing with strict bank saving requirements as a condition to get loans were released and consequently the availability of bank loans for ordinary households' housing investments became significantly easier than earlier. Competition between banks became harder and new forms of housing finance emerged. The significance of market based interest rates increased instead of previous administratively given interest rates. The interest rates of housing loans became more and more dependent on international financial markets. This together with lowering inflation rate caused that real interest rates became permanently positive, unlike in the 1970s and in the beginning of 1980s.

Interest payments of bank loans – including housing loans - were deductible in income taxation until the year 1992. The rules of tax deductions

were changed in several stages during the years1984-92 by setting an upper limit and excess limit[6] to the sum of deduction. Still, with continuously increasing marginal tax rate of income taxation, deduction rights meant a significant lowering, 4-6 percent points, in the after tax real interest rate for average households. As a matter of fact, as figure 5.13 shows, real after tax interest rates remained negative almost all the time during the 1970s and 1980s. The tax reform starting in 1993 changed essentially the rules concerning the deduction rights concerning interest payments of housing loans. In the new system a taxpayer could in practice deduct 25 % (tax rate of capital income) of interest expenditure related to housing loans from taxes (for buyers of the first dwelling the rate was 30 %). The system has remained basically the same since 1993 but the tax rate of capital income has increased to 28 %.

The liberalisation of Finnish financial markets was followed by extremely rapid growth of housing loans (figure 5.14). The real value of the housing loan stock increased by a half during three years, from the end of 1986 to the end of 1989.

Figure 5.13: *Real interest rate and real after tax interest rate (%) in Finland 1970-99*

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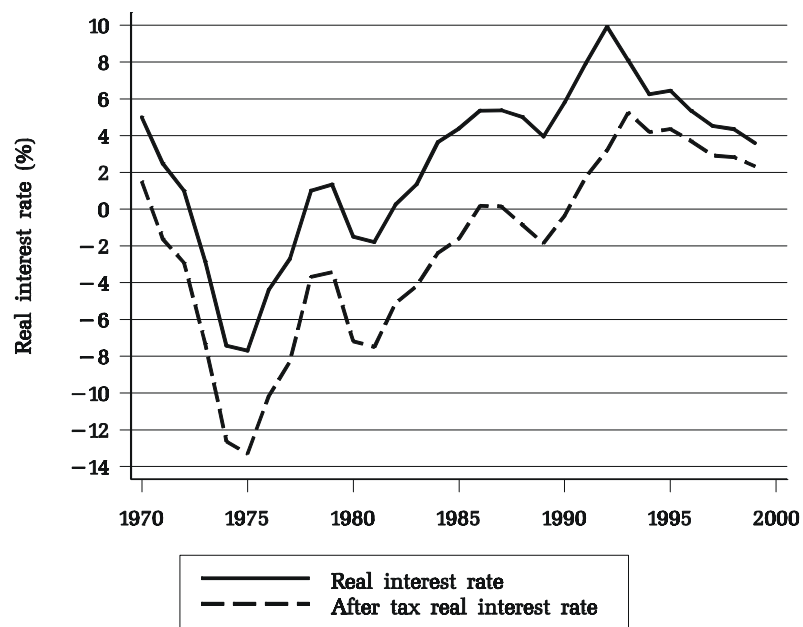
[6] Taxpayer had right to deduct only the sum exceeding the excess limit.

Figure 5.14: *The stock of housing loans from banks to households in Finland 1970-99, real index 1983=100*
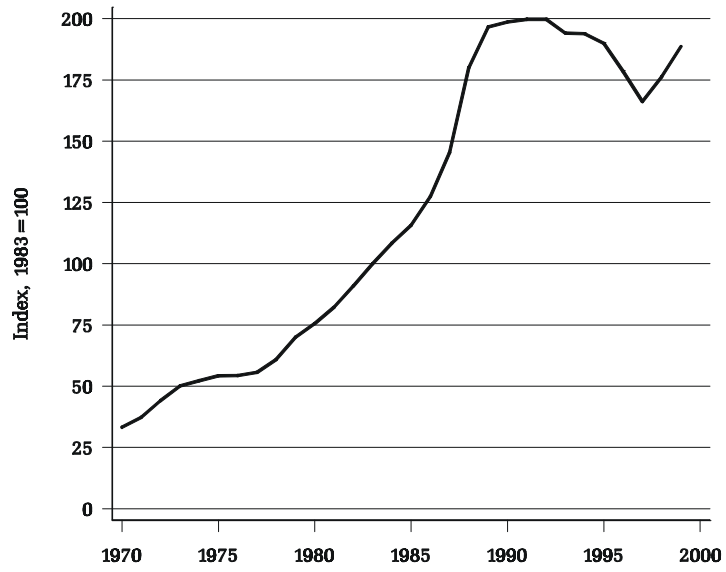
6 RESULTS OF THE EMPIRICAL STUDY

Estimation results of demand, supply and price models of regional housing markets are presented in this section. The data in estimations is the panel of 85 sub-regions from the years 1981-97[7]. The description of the basic models used in estimations is in section 3 and of the data in section 4.

Demand model

The general specification of the housing demand model is presented in equation (1) in section 3. The quantity of housing consumption is measured by the total floor space of occupied housing stock. The variation of stock with respect to quality and location is not taken into account. The logarithm of the occupied floor space change from previous year ($\log(\text{Quantity}_t/\text{Quantity}_{t-1})$) is explained by the following factors:

- $\log(\text{Population}_t/\text{Population}_{t-1})$ Change in population at regional level

- $\log((\text{Hh/pop})_t/(\text{Hh/pop})_{t-1})$ Change in the households/population relation at regional level (indicating the changing age and household structure and compensating the lack of a proper demographic demand variable)

- $\log(\text{Income}_t/\text{Income}_{t-1})$ Change in average real gross taxable income per income receiver at regional level

- $\log(\text{Unemployment}_t)$ Unemployment rate at regional level (indicating the uncertainty of income expectations to compensate the lack of a correct permanent income variable)

- $\log(\text{Realprice}_t/\text{Realprice}_{t-1})$ Change in real housing price at regional level.

Following the ideas presented in sections 2 and 3 housing demand is considered as a function of demographic demand (population and households), permanent income (real income and labour market factors) and user costs of housing (real housing price).

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[7] Years 1981-82 are only used for lags of certain variables.

In the demand model real housing price is considered as an endogenous variable and the rest of the variables as exogenous variables. The model is estimated using the two-stages least squares method and instrument technique. Real after tax interest rates, real value of housing loans (both at national level) and the exogenous variables of the model are used as instruments for real housing price. To take into account the size variation of sub-regions observations are weighted by their population size in estimations.

There are reasons to assume that the parameter values of the model differ between regions. First, there may be differences between regions with respect to the level of demand change, because of latent factors not included in the model. This was tested by adding 85 sub-regional dummy variables in the model and estimating the coefficients of these regional factors. The results of this model are not reported in this paper but they are commented later. Second, the parameters of the other explanatory variables may differ between regions. This hypothesis was tested estimating the same model separately for each region group.

Estimation results of one model specification for the pooled data and for each region type are presented in table 6.1.

Table 6.1: *Estimation results of the housing demand model*

Data	85 sub-regions, years 1983-97				
Dependent variable	$\log(\text{Quantity}_t/\text{Quantity}_{t-1})$				
Independent variables	Coefficient (t-statistic in parenthesis)				
	All regions	Helsinki reg.	Major urb. areas	Small urb. areas	Rural areas
	(1)	(2)	(3)	(4)	(5)
Intercept	0.016 (22.4)	0.023 (4.2)	0.028 (12.8)	0.015 (8.8)	0.114(9.3)
$\log(\text{Popul}_t/\text{Popul}_{t-1})$	0.743 (31.8)	0.767 (1.8)	0.834 (10.8)	0.936 (13.9)	0.950 (22.3)
$\log((\text{Hh/pop})_t/(\text{Hh/pop})_{t-1})$	0.642 (18.1)	0.093 (0.5)	0.337 (3.2)	0.593 (7.7)	0.821 (18.6)
$\log(\text{Unemployment}_t)$	-0.003 (-11.7)	-0.005 (-4.7)	-0.006 (-8.3)	-0.002 (-3.7)	-0.001(-2.7)
$\log(\text{Income}_t/\text{Income}_{t-1})$	0.021 (2.9)	-0.088 (-2.7)	-0.049 (-2.2)	0.027 (1.6)	0.042(4.2)
$\log(\text{Realprice}_{t-1})$	-0.006 (-4.1)	-0.005 (-1.2)	-0.013 (-3.3)	-0.002 (-0.4)	0.00 (0.3)
Adj. R^2	0.563	0.722	0.615	0.449	0.559
Durbin-Watson	1.742	1.735	1.185	2.068	2.035
N:o of sub-regions	85	1	7	27	50
N:o of observations	1275	15	105	405	750

Model (1) with pooled data explains 56 percent of the total variation of housing demand change. This is a reasonable degree of explanation when taking into account that time series in the model are in difference form. The significant intercept indicates that there is growth trend - approximately 1.6 percent per year - in housing consumption. Demographic development - population change and the change of household structure - get significant coefficients and explain a major part of demand development. This means that population growth as well as the increase of the household/population relation (in other words the decrease of average household size) affect housing demand positively. The level of unemployment rate has a significant negative effect while income change has a positive effect on housing demand. Still, the coefficient of the income variable cannot alone be considered as the income elasticity of housing consumption. Instead, unemployment effect, gross income effect and, in addition, the trend (intercept term) should be considered jointly to derive the effect of permanent income development on housing consumption. Real housing price represents the user costs of housing in the model. It has a negative effect on housing consumption, in other words, housing price growth slows down housing consumption growth while price decline has an opposite effect.

The regional models (2)-(5), estimated separately for groups of sub-regions give basically similar results as the pooled data model but some differences can be found. In the models for Helsinki (2) and other major urban areas (3) the coefficients of the intercept (growth trend) have a significantly higher values than in the pooled case, and the coefficients of the income variable have wrong (negative) signs. In the Helsinki model the coefficients of demographic variables and the price-variable are not significant, probably because of small number of observations. Model (5) for rural areas has a clearly higher intercept coefficient than other models. Real price effect is not significant in model (4) and (5). According to Durbin-Watson statistic there is a 1st order auto-correlation problem in model (3) while the other models are satisfactory with this respect. Explanation rates (R^2) differ significantly between regional models: in the Helsinki model (2) total correlation is 0.72 while it is only 0.45 in model (4) for small urban areas.

When the pooled data model (1) is estimated adding 84 sub-regional dummy variables in the model the explanation rate increases and several of the region dummies get a significant coefficient. Still, the side effect is that the

regional dummy variables catch part of the explanation power of demographic and permanent income variables. The reason is that there are systematic differences between sub-regions with respect to demographic and income development, as presented in section 4. Estimation results of the sub-region dummy model are available from the author upon request.

The actual development of housing consumption (occupied floor space) and the fit based on model (1) estimated from pooled data are presented in figure 6.1. The figure shows that the model fits reasonably well during the boom and bust years but fails significantly in years 1983-85 when the actual growth of housing consumption was systematically faster than the model predicts. Another failure takes place in 1995 and thereafter when actual growth rate of housing consumption was lower than expected according to the model.

Figure 6.1: *Realized and estimated housing demand change (results of model (1) aggregated at country level)*
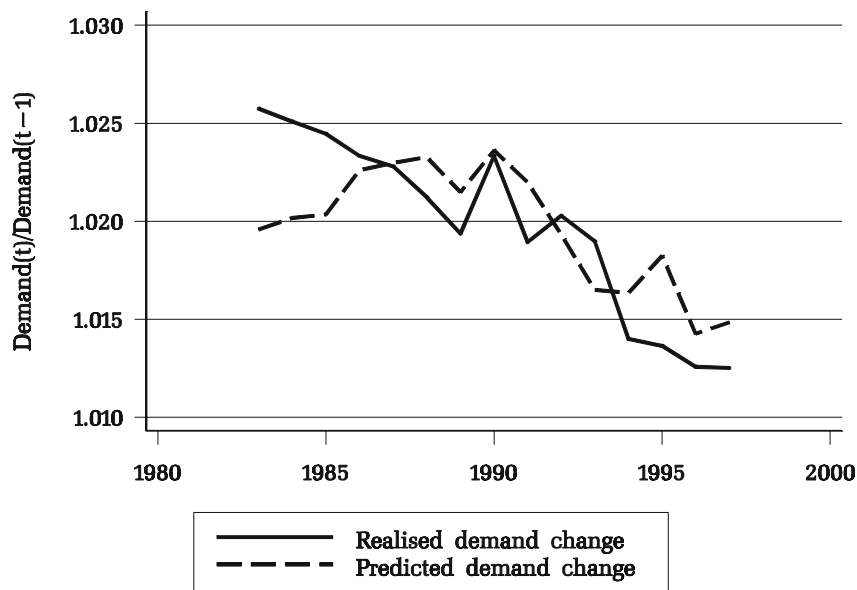
Respective figures by region groups, based on estimated models (2)-(5), are presented in figure 6.2. They show that the model fits quite well for the Helsinki region and reasonably well for other major urban areas while there are

more problems in the models of the other two region groups, especially for the years 1983-85 and 1995-97.

Figure 6.2: *Realized and estimated housing demand change by region type (results of models (2)-(5) aggregated at region group level)*
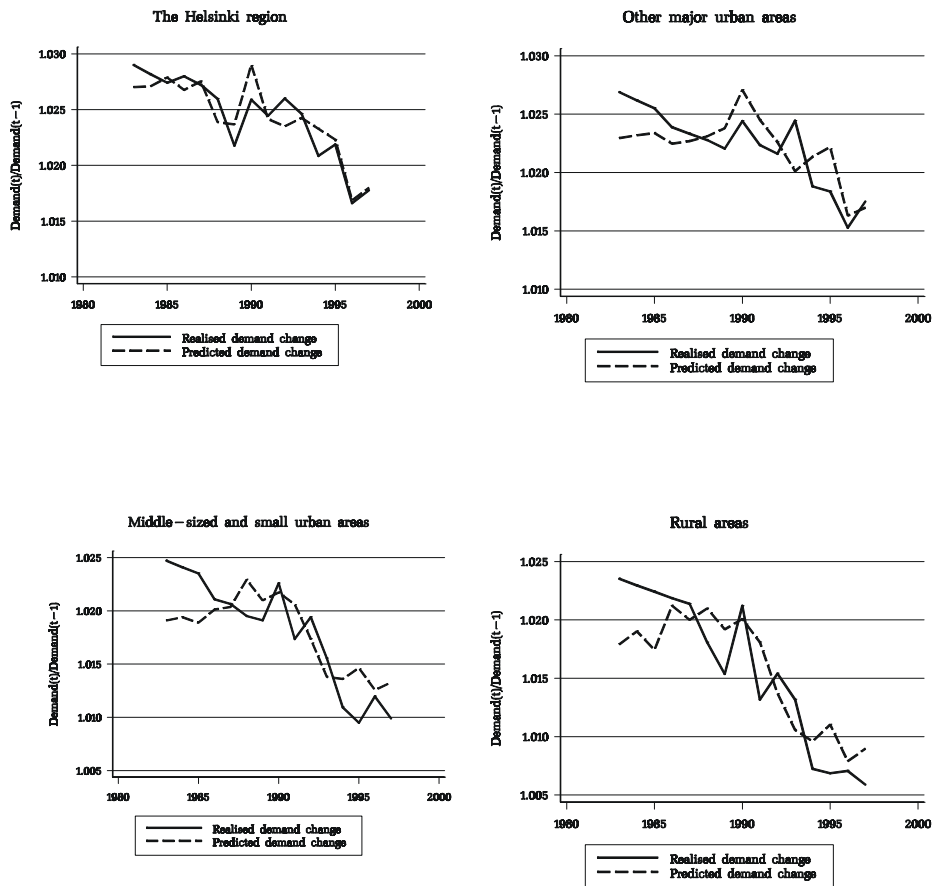
Supply model

The empirical (flow) supply model to be estimated is presented in equation (3) in section 3. The quantity of housing construction is measured by the total floor space of completed housing units during one year relative to the floor space of total housing stock (occupied + vacant) at the end of previous year. The logarithm of the relative supply change $\log(100*Completed_t/Stock_{t-1}))$ is explained by the following factors:

- $\log(Realprice_{t-1})$ Real housing price level of previous period at regional level
- $\log(Realprice_{t-1}/$ Change in real housing price of previous period $Realprice_{t-2})$ at regional level
- R_{t-1} Real interest rate level of previous period at national level
- $\log(Cons.cost_{t-1})$ Real construction costs of previous period at national level
- $D_1,...,D_{84}$ Sub-regional dummy variables.

According to the ideas of sections 2 and 3 housing (flow) supply is assumed to be a function of expected selling price level (indicated by the price level of existing stock) and main cost factors (real interest rates and construction costs). These factors reflect basically the effects of national level factors on local housing supply. In addition, it is assumed that there are local demand factors, supply restrictions and cost factors causing variation in supply between sub-regions. In the model these are controlled by including sub-regional dummy variables (85 minus 1) in the model.

Housing construction is a slow process taking at least one year from the construction decision to the completion of the building. For this reason all the independent variables in the models are lagged by one year. Real housing price is considered as endogenous while real interest rate, construction costs and region dummies are exogenous variables. Like in the case of demand, the supply model is estimated using the two-stages least squares method and instrument technique. Real after tax interest rates, real value of housing loans (both at national level), local population change and the exogenous variables of

the model are used as instruments for real housing price. The population size is used as weight in estimations.

The supply model is estimated for the pooled sub-regional data and separately for four region groups, just like with demand models. The estimation period is 1983-97. Estimation results are presented in table 6.2. All model versions explain 70-80 % of the annual and sub-regional variation of housing construction relative to housing stock. Real prices - included in the model both as lagged level and annual change - explain a great deal of the variation of construction activity. The effect of real interest rate is also significant and influences housing construction negatively, as expected. Real construction costs (at least when measured by construction cost index) got a positive coefficient in all model versions in which it was included. This indicates that construction costs merely follow construction activity rather than cause any systematic negative effect on it. For this reason construction cost variable is not included in the model versions on table 6.2. Most of the sub-regional dummy variables get a significant coefficient indicating that there are systematic regional differences in the relative level of construction activity due to local demand and cost factors. The coefficients of sub-regional dummy variables are not reported in table 6.2 but are available from the author upon request.

The regional models (2)-(5) differ slightly from each other. For example, the coefficient of the real price variable is lowest in Helsinki and highest in the rural areas. The explanation may be that price variation is highest in Helsinki and lowest in rural areas, respectively.

Table 6.2: Estimation results of the supply model

Data	85 sub-regions, years 1983-97				
Dependent variable	log(100*Completed$_t$/Stock$_{t-1}$)				
Independent variables	Coefficient (t-statistic in parenthesis)				
	All regions	Helsinki reg.	Major urb. areas	Small urb. areas	Rural areas
	(1)	(2)	(3)	(4)	(5)
Intercept	-5.246 (-21.9)	-2.667 (-2.9)	-3.812 (-6.5)	-6.912 (-15.3)	-7.852 (-20.2)
log(Realprice$_{t-1}$)	1.360 (26.9)	0.792 (4.1)	1.032 (8.2)	1.742 (18.2)	1.966 (23.8)
log(Rprice$_{t-1}$/Rprice$_{t-2}$)	0.413 (4.6)	0.298 (0.9)	0.592 (2.7)	0.664 (3.7)	0.206 (1.3)
Realinterest $_{t-1}$	-0.086 (-27.1)	-0.040 (-2.7)	-0.067 (-9.0)	-0.101 (-17.5)	-0.123 (-24.5)
Adj. R^2	0.698	0.727	0.765	0.762	0.719
Durbin-Watson	1.034	1.144	1.193	1.136	1.257
N:o of sub-regions	85	1	7	27	50
N:o of observations	1275	15	105	405	750
N:o of sub-reg. dummies	84	-	6	26	49

Figure 6.3: Realized and estimated housing construction (results of model (1) aggregated at country level)

Realised production —— Predicted production − − −
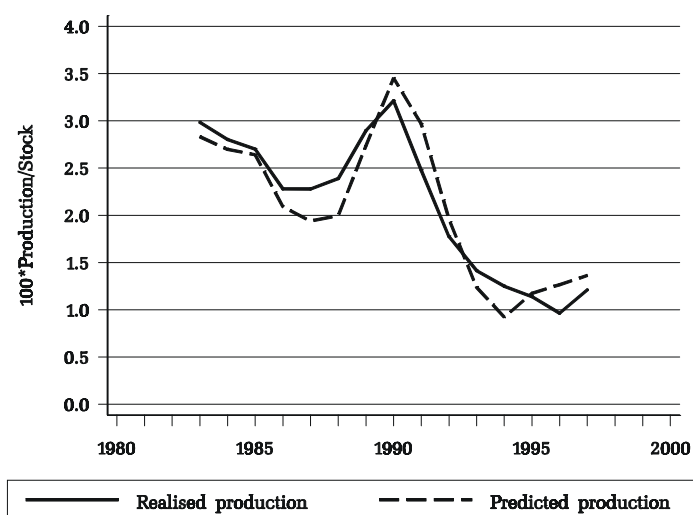
The actual development of housing construction (completed floor space relative to housing stock) and the fits based on models (1)-(5) of table 6.2 are presented in figures 6.3 and 6.4. Models fit reasonably well both at aggregated country level and at sub-regional level. The most significant error is in middle-sized urban and rural areas in the years 1986-89 when construction was at much higher level than the model forecasts. Another systematic error can be found after the recession in 1994-97. In all region groups models forecast lower production in 1994 and higher production in 1996-97 than was actually realised. One explanation for these deviations may be in public construction subsidies which affected construction activity partly outside the market mechanism.

Figure 6.4: Realized and estimated housing production by region type (results of models (2)-(5) aggregated at region group level)
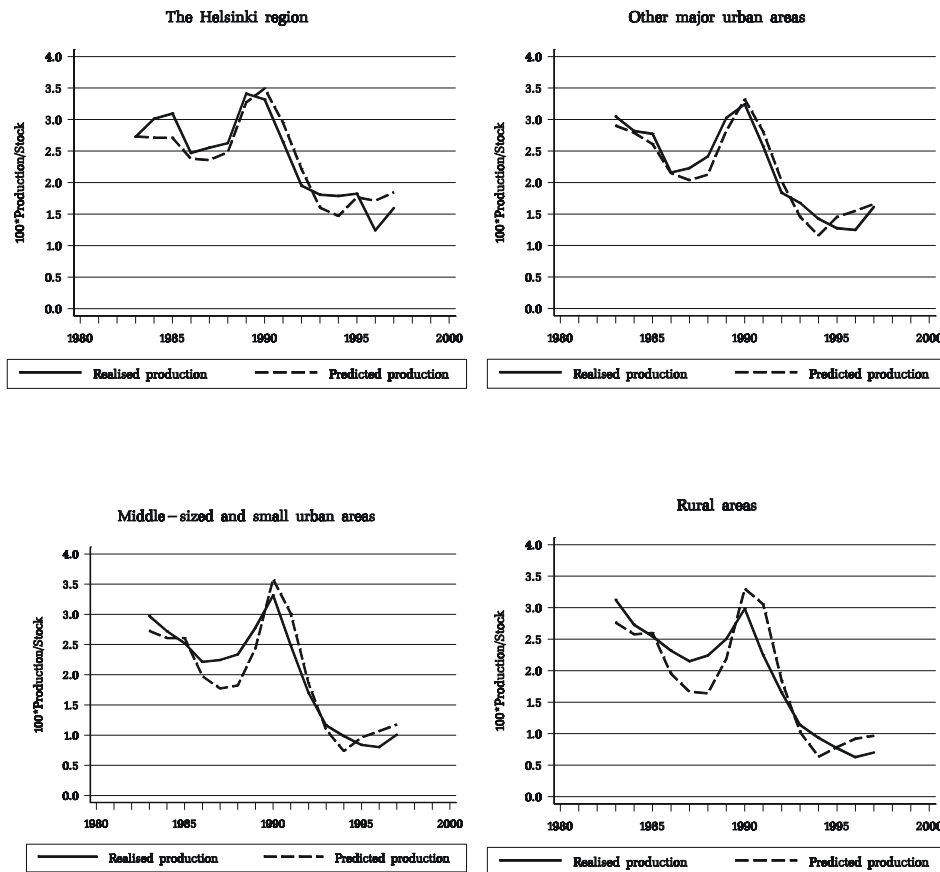
Price model

The basic ideas and the specification of the housing price model are presented in section 3. According to the model the logarithm of the real price change from previous year $(\log(\text{Realprice}_t/\text{Realprice}_{t-1}))$ is explained by the following fundamental factors:

- $\log(\text{Jobs}_t/\text{Jobs}_{t-1})$ Change in the number of jobs at regional level
- $\log(\text{Income}_t/\text{Income}_{t-1})$ Change in average real gross taxable income per

income receiver at regional level

- $Atr_t - Atr_{t-1}$ Change in after tax real interest rate (percent points) at national level
- $\log(Vacancy_{t-1})$ Regional vacancy rate, i.e. floor space of vacant + temp. occupied dwellings / floor space of stock (per cent)

Jobs and income represent the basic local housing demand factors. Variables related to local demography (number of population, proportion of age groups 20-29, population/household ratio) are not used in the price model because they did not add their explanatory power when used together with jobs and income. Instead, they are used as instruments for vacancy rate. The cost factor related to housing finance is represented by the after tax real interest rate. All the above variables are considered as exogenous variables in the model.

The imbalance of local housing markets is represented in the model by vacancy rate. The hypothesis is that a low vacancy rate indicates tightness of local housing markets and pushes prices up, and vice versa. Unlike the other variables it is included as a lagged level, instead of a change from the previous period. It is considered as an endogenous variable because both the quantity demanded and supplied (both affected by housing price) influence it, in addition to exogenous supply factors, like availability of land, planning rules and other external constraints of housing construction.

In addition to the above fundamental factors, the dynamic components defined in the previous section are included in some versions of the model:

- $\log(Realprice_{t-1}/Realprice_{t-2})$ Real price change of the previous period
- $\log(Equilibriumprice_{t-1}/Realprice_{t-1})$ Gap between estimated equilibrium price and actual real price.

The availability of housing loans has strongly affected Finnish housing markets. From the point of view of households there was credit rationing until the liberalisation of financial markets. Most of the restrictions were cancelled during 1986-88. Growth of real stock of housing loans from banks to

households at national level is in this study interpreted - not as a basic reason for demand growth - but instead as a means for households to achieve their housing consumption targets. Consequently it is not considered as a fundamental factor for housing demand. Instead, this variable is used as an instrument for vacancy rate.

Like in the cases of housing demand and supply models, price models are estimated for the pooled sub-regional data and separately for four region groups. The estimation period is 1983-97. In addition, year 1982 is available for lagged values. All models are estimated with 2SLQ method using instruments for the vacancy rate.

In the model with price bubble included (model (3) in table 6.3) the bubble variable was calculated using two iterations for the parameters of fundamental factors. The principle of the iterative calculation of the bubble is explained in section 3.

Estimation results of four alternative model specifications for pooled data are presented in table 6.3. All model versions explain 64-66 percent of the annual and sub-regional price change. According to estimation results the basic regional demand factors, job change and real income change affect housing prices positively, as expected. The cost factor related to housing finance - real after tax interest rate - is also significant and influences the price change negatively. The imbalance indicator of housing markets – the vacancy rate - also has a significant negative effect on the speed of price change: the higher the vacancy rate at the end of the previous period the lower the price change. The coefficients of these fundamental factors differ only slightly between model versions.

Real price change of the previous period is included in models (2) and (3). The coefficient of this dynamic term is significant and its sign is positive. It indicates that realised price change has some positive effect on future price change, in other words, there is some tendency for price bubbles. Still, the effect is not strong, at least at annual level: a 10 percent price growth in period t causes only a 0.8-0.9 percent increase to price in period t+1. Model (3) also includes the estimated gap between equilibrium and actual housing price as an additional dynamic factor. The coefficient of the gap factor is not significant in model (3) and its sign is negative while it is expected to be positive. The result does not support the hypothesis about the bursts of bubbles as a mechanism to turn the trend in housing prices.

Estimation results of one model type estimated separately for sub-region
groups are presented in table 6.4. In this model version the lagged price change
is included in the model as an independent variable but the bubble variable is
not. The model for the Helsinki region clearly suffers from multicollinearity
problems, partly because of small sample size. Only job change and vacancy
rate get significant coefficients with expected signs. In spite of this, the model
explains over 80 % price change variation. The model of other major urban
areas has partly the same kind of problems. Only in the model of rural areas all
coefficients are significant with expected signs.

Figures 6.5 and 6.6 demonstrate the goodness of fit of models. Figure 6.5
is based on model (2) of table 6.3 while figure 6.6 is based on the models of
table 6.4. Figures show that the predicted developments based on estimated
price models fit very well relative to observed price development. The only
systematic error is that the realised price growth peaks in 1988-89 were higher
than those expected on the basis of the model.

Table 6.3: *Estimation results of price models with pooled data*

<u>Data</u>	85 sub-regions, years 1983-97.		
<u>Dependent variable</u>	$\log(\text{Realprice}_t/\text{Realprice}_{t-1})$		
<u>Independent variables</u>	<u>Coefficient (t-statistic in parenthesis)</u>		
	(1)	(2)	(3)
Intercept	0.425 (11.9)	0.388 (10.5)	0.396 (10.7)
$\log(\text{Job}_t/\text{Job}_{t-1})$	0.580 (6.7)	0.584 (7.0)	0.604 (7.2)
$\log(\text{Income}_t/\text{Income}_{t-1})$	1.093 (9.4)	0.843 (6.1)	0.832 (6.0)
$\text{Atr}_t\text{-Atr}_{t-1}$	-0.041 (-17.9)	-0.041 (-18.6)	-0.041 (-18.6)
$\log(\text{Vacancyrate}_{t-1})$	-0.241 (-11.8)	-0.217 (-10.1)	-0.222 (-10.3)
$\log(\text{Realprice}_{t-1}/\text{Realprice}_{t-2})$		0.088 (3.1)	0.082 (2.9)
$\log(\text{Equilprice}_{t-1}/\text{Realprice}_{t-1})$			-0.008 (-1.4)
Adj. R^2	0.640	0.654	0.657
Durbin-Watson	1.326	1.456	1.484
N:o of sub-regions	85	85	85
N:o of observations	1275	1275	1275

Table 6.4: *Estimation results of price models by region groups*

Data	85 sub-regions, years 1983-97.			
Dependent variable	log(Realprice$_t$/Realprice$_{t-1}$)			
Independent variables	Coefficient (t-statistic in parenthesis)			
	Helsinki reg.	Major urb. areas	Small urb. areas	Rural areas
	(1)	(2)	(3)	(4)
Intercept	1.341 (2.6)	0.495 (4.7)	0.419 (8.4)	0.333 (6.4)
log(Job$_t$/Job$_{t-1}$)	2.508 (2.5)	1.111 (4.0)	0.986 (6.5)	0.671 (6.1)
log(Income$_t$/Income$_{t-1}$)	-1.928 (-0.9)	-0.113 (-0.2)	0.004 (0.1)	0.844 (5.6)
Atr$_t$-Atr$_{t-1}$	-0.018 (-0.8)	-0.032 (-4.7)	-0.034 (-9.1)	-0.037 (-12.8)
log(Vacancyrate$_{t-1}$)	-0.827 (-2.5)	-0.275 (-4.5)	-0.221 (-7.9)	-0.173 (-6.2)
log(Realprice$_{t-1}$/Realprice$_{t-2}$)	-0.131 (-0.6)	0.119 (1.5)	0.166 (3.5)	0.107 (2.7)
Adj. R^2	0.818	0.776	0.674	0.605
Durbin-Watson	2.185	1.516	1.648	1.749
N:o of sub-regions	1	7	27	50
N:o of observations	15	105	405	750

Figure 6.5: *Realised and estimated housing price change (results of model (2) in table 6.3 aggregated at country level)*
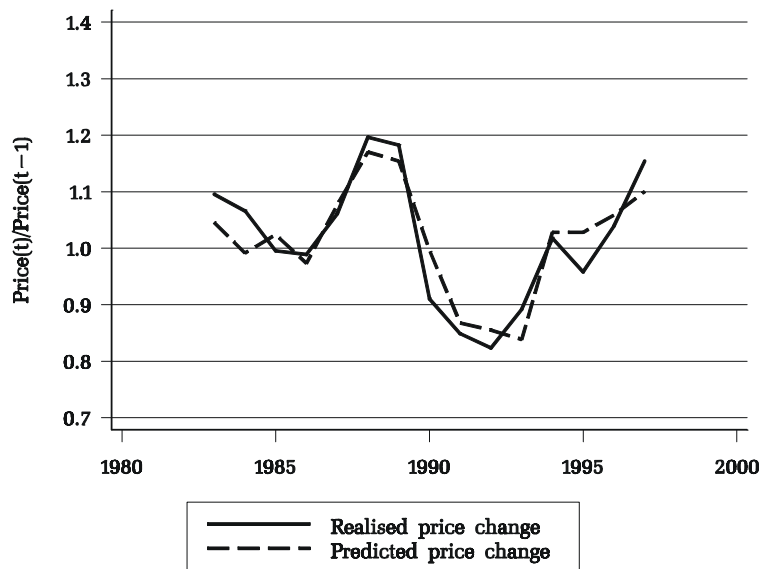
Figure 6.6: *Realised and estimated housing price change by region type (results of table 6.4 aggregated at region group level)*
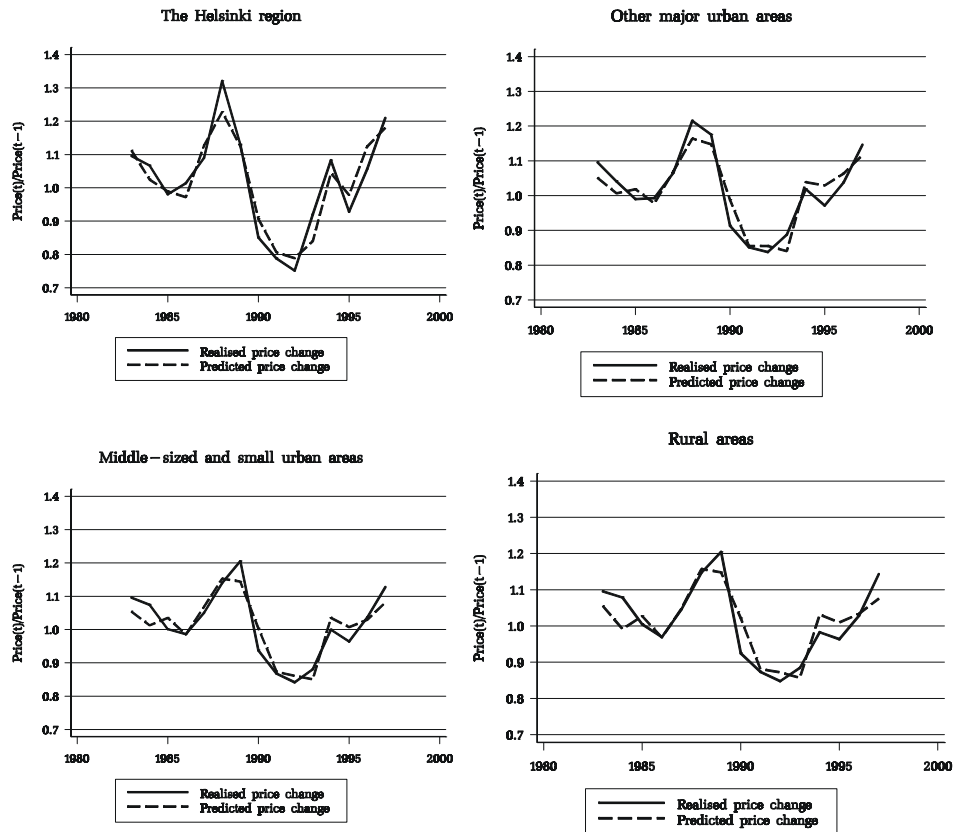
Summary of and comments on estimation results

In this section the developments of regional housing markets during 1980s and 1990s have been analysed using econometric methods. The data consist of annual time-series at sub-regional level. The main interest is the relationship between the quantity of housing consumption (housing demand), housing construction (flow supply), housing prices and various national and local economic and demographic factors. The aim is to explain the dramatic developments of housing prices and housing construction - as well as the less

dramatic development of housing consumption - during the boom of 1980s and the depression in early 1990s.

An essential feature of housing markets is that the main variables are interrelated. The quantity of housing consumption, housing construction, vacancy rates and housing prices are endogenous factors having a significant effect on each other. Demography, income, employment and unemployment are the main external factors affecting housing demand while construction costs, interest rates, taxation rules and other user costs of housing are the most important external factors influencing costs of housing consumption and construction. Some of the exogenous factors are basically local, like demography while others are purely national, especially interest rates and also taxation to great extent. Some of the factors have a common national trend with local variation, for example income and employment developments.

Econometric models are estimated using sub-regional panel data for the years 1983-97 and the two-stages least squares estimation method. In each model exogenous instrument variables are used for the endogenous variables. Estimations are run for the pooled data and separately for four different region groups.

According to the results the variation of local housing consumption - measured by occupied floor space - depends on demographic factors, income factors and housing cost factors. Population growth as well as the change of household structure (measured by household/population ratio) has a significant positive effect on local housing consumption. Rise of permanent income (measured by gross income per capita and unemployment rate) increases housing consumption while rise of user cost of housing (measured by real housing price) has a negative effect, respectively.

Local housing construction - measured by completed floor space relative to housing stock - depends basically on two factors: real housing price and real interest rate in previous periods. These factors reflect the effects of expected selling price and financing costs of construction from the point of view of profit maximising firms. Lags are essential because the time from the decision making to the completion of new housing is quite long, one year at the minimum. Construction costs - measured by real construction cost index - do not have a negative effect on housing construction according to estimations. Instead, they seem to follow construction activity. In addition to housing prices and interest rates, there are local demand and cost factors and supply

restrictions affecting housing construction activity. In estimations these are taken into account using sub-regional dummy variables.

The main variables used to explain local housing price development - measured by real housing price index - are local demand factors, after tax interest rates and vacancy rates. Local demand factors - the change in the number of jobs and income level - have a significant positive effect on housing prices. Real after tax interest rate - reflecting the joint effect of interest rate level, inflation and tax deduction rules - has a strong negative effect on real housing prices. Vacancy rate (the proportion of empty and temporarily occupied floor space in housing stock) has also a significant negative effect on real prices: the lower the vacancy rate the faster real prices increase and vice versa. Vacant dwellings work as a buffer in housing markets and the vacancy rate acts as an indicator of the tightness of local housing markets.

In addition to these fundamental factors, price change from the previous period has some effect on the price change to the next period. This indicates a tendency to have price bubbles, in other words, price growth (decline) creates expectations of the continuation of growth (decline). Still, it must be pointed out that according to the estimation results this effect is not especially strong and explains only a minor part of the dramatic real price changes in 1980s and 1990s. A variable for the gap between equilibrium price based on housing market fundamentals and actual price was also constructed in one model version to test the hypothesis of mechanisms to burst the bubble. This variable got an insignificant coefficient with wrong sign in estimations. Consequently, results of this study do not give evidence on growths and bursts of significant price bubbles in Finnish housing markets when the development is considered at annual level. It must, however, be noted that a great deal of short run volatility is eliminated when annual averages are studied. It is evident that quarterly, monthly or weekly data about housing prices and its determinants would give another picture of the price dynamics, as the study by Barot and Takala (1998) shows.

There is variation with respect to both housing demand, supply and price developments between sub-regions. The reason for this is mainly in different local demand factors, especially demographic and employment developments. Results of this study indicate that there are also some differences in the coefficients of independent variables between regions when models are estimated separately for region groups. Still, it must be pointed out that the

basic trends of housing markets were very similar in all regions in Finland during 1980s and 1990s. All regions experienced a price boom in 1987-89 and a sharp collapse after that. Construction boom followed the price boom and construction depression came after the price collapse in all regions, too. Finally, the development of housing consumption was reasonably stable all over the country. The reason for this regional similarity is that the most crucial external effects on housing markets – changes in interest rates, taxation rules, and income, employment and inflation development - took place at national level and were transmitted to all local housing markets approximately at the same time. Only years after the depression, from 1997 on, there seem to have appeared clear deviations between regions with respect to housing market developments: This is a consequence of recently increasing polarisation of regional employment and population development.

7 REGIONAL HOUSING MARKETS IN FINLAND DURING BOOM AND DEPRESSION

Which factors caused in Finnish housing markets the overheating in the second half of the 1980s and the depression in the first years of the 1990s? In the following the major trends and turns of national and local housing markets are analysed and interpreted. The analysis is based on data and estimation results presented in previous sections.

Regional housing markets in Finland before the year 1985

The Finnish economy and housing markets as its essential part experienced a period of rapid growth with many features of over-heating in the second part of the 1980s. From the point of view of housing markets the background of over-heating is connected with the development of previous years and decenniums. The Finnish economy grew rapidly almost the whole period after the World War 2 until the end of the 1980s. The only major recession was experienced in the second half of the 1970s as a consequence of the oil crisis. The concentration of production and population in the urban regions mainly in the Southern parts of the country proceeded fast. The migration within the country and from time to time abroad was active until the first years of the 1970s. After that there was an exceptionally stable period in the Finland's regional development lasting till mid 1989s.

Alongside the economic growth housing consumption increased rapidly. The floor space of occupied housing stock grew by nearly 4 percent annually in average from the year 1960 to 1980. In the Helsinki region and in other major urban areas the growth was even faster. The growth rate slowed down to the annual level of 2.5-3 percent in the second half of the 1970s and in the beginning of the 1980s. The average floor space per capita almost doubled from the year 1960 to the year 1980. The main factor in the housing consumption growth was the economic growth and consequent increase in the disposable income of households. In addition, the change of the population structure and the related growth of the number of households and the decrease of average household size explained the growth of housing consumption.

The growth of housing demand was followed by the construction of new housing. The volume of production increased to an exceptionally high level in the first half of the 1970s because public finance to housing construction[8] was added significantly at the same time as free market production was increased as a consequence of housing price growth. The production was at a high level both in growing urban areas and in the countryside. The share of the publicly financed arava-production increased to more than half of the total volume while free market production had the dominant role in the 1960s.

Housing prices increased in real terms almost monotonically from mid 1940s to mid 1970s, except a few individual years. In Helsinki real housing prices grew to 4.5 fold from the year 1947 to 1974. The long growth period culminated in the price boom of years 1973-74 influencing strongly housing production, as well. During the recession following the oil crisis real housing prices declined by a quarter in the second half of the 1970s. It must be noted that the fall of real prices was based on high inflation rate, because nominal prices did not decline then. Generally, there was no essential difference in housing price development between the Helsinki region and the whole country during the 1970s. The only major exception was the price peak in the beginning of the 1970s and the following drop of prices which both were steeper in the Helsinki region than in the whole country.

Housing rents were controlled almost the whole period after the World War 2 until the beginning of the 1990s. For this reason the trend of rents had no evident connection with the trend of housing prices. Real rents decreased almost continuously from the start of the 1960s to mid 1980s. Real rent level was approximately 30 percent lower in 1985 than 25 year earlier. The migration and the growth of young adults increased the demand for rented dwellings but at the same time the stock of privately owned shrank sharply due to rent control. The construction of publicly financed arava rented dwellings compensated the diminishing of free market dwellings partly, especially in the 1970s. In the rented sector the pressure of demand was not allowed to influence rent level. Instead, if was reflected in the availability of rented dwellings and the queues of publicly owned rental housing. In fact, the insufficient supply of rented dwellings created additional pressure to the free market owner occupied sector where prices were market based.

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[8] s.k. "arava" loans

Financial markets were controlled in Finland until mid 1980s. Housing finance was purely in the hands of deposit banks, except the arava system. Financial institutions specialised on housing finance – typical in several other industrialised countries – did not exist in Finland. The availability of housing loans was strictly controlled and there were normally significant pre-saving requirements and client relation conditions connected with granting loans. Interest rates were determined administratively and their level was low most of the time when taken into account the inflation rate. Interest rates of loans were deductible from taxable income. This was most significant for high and middle income households having high marginal income tax rate.

After tax interest rates were negative most of the time from the beginning of the 1970s to mid 1980s. Real interest rates declined a lot during the first half of the 1970s with a significant effect on the housing price boom experienced then. According to figure 3.13 after tax interest rate for a average household was approximately -13 % in 1975. It meant that it was profitable to take all the loan from bank one ever could get. In spite of the controlled loan markets household sector's housing loan stock increased strongly because owner occupied housing become more general and real housing prices were increasing.

The basic elements of housing policy until mid 1980s were the public financing of housing production, deductibility of housing loan interest rates in taxation, and rent control. The system of housing allowances existed but its role were not central due to rent control and shrinking rental dwelling stock. Arava loans for housing production were mainly targeted to owner occupied housing in the 1950s and 1960s. In addition, a great deal of subsidies were allocated for building residential houses in countryside farms until the beginning of the 1960s. The focus was changed in the beginning of 1970s when arava loans for the production of rental housing was increased significantly. Still, arava loans for owner occupied housing were not cut. Instead the volume of publicly financed housing construction increased dramatically and its proportion of total housing construction became more than a half during the 1970s. In the first part of the 1980s the share declined again.

The increase of the volume and share of publicly financed housing production meant that the majority of new dwellings were targeted and allocated to low and middle income households. At the same time it meant that an increasing part of the housing stock became to the control of the public

sector with respect to quality, price, size distribution, house type distribution and selection of renters. This had a significant effect of the development of the later housing stock structure.

The overheating of Finnish housing markets in 1985-89

In the mid 1980s Finland had recovered from the recession after the oil crisis and had enjoyed several years of reasonable stable economic growth. Unemployment rate had decreased to approximately 5 percent at national level and below 2 percent in the Helsinki region. In the years 1986-88 the growth of production, employment and real income accelerated. In the Helsinki region the number of jobs increased by more than 4 percent both in 1986 and in 1987. Unemployment rate approached one percent and the lack of labour became a topical problem in many industrials. In other parts of the country the trend was similar, in spite of the fact that unemployment rate was higher than in Helsinki. Households' disposable income increased rapidly and because of good employment situation the expectations on the future income prospects were most positive.

In spite of the long lasting fast increase in housing consumption the average level of housing floor space per capita was still remarkably lower than in other industrialised countries at same economic level. The gap with respect to housing consumption was especially wide when compared with other Nordic countries. Consequently there was a big pressure to increase housing consumption.

The privately owned rental dwelling stock shrank further due to rent control. Owners sold their dwellings to be changed to owner occupied dwellings and invested the money to more profitable targets. This created pressure - and in many cases forced - households to move from the rented sector to the owner occupied sector. In addition, the stock of rental dwellings mainly consisted of small units in multi-storey buildings. Consequently, in the case of many families increasing floor space required moving to the owner occupied sector, because larger dwellings were only available there.

The vacancy rate was exceptionally low in 1987 because in the previous years housing consumption increased faster than the housing stock. This meant that vacant dwellings did not function as a buffer against demand growth.

The gradual liberalisation of financial markets meant that the availability of housing loans became significantly easier than before since the year 1986. Real interest rates increased in the first half of the 1980s but still after tax interest rates were negative in 1985. Real interest rates decreased in 1987-89. The deductibility rights of interest rates in taxation remained essentially the same as before, in spite of the fact that the upper limit of deductible interest rates was lowered.

The need to increase housing consumption, the shift from the rental sector to the owner occupied sector, good employment, income growth and optimistic income expectations, low after tax real interest rate, and the improvement of the availability of housing loans were the key factors together creating huge increase in housing demand in 1986-89. Exceptionally low vacancy rate and the normal lag in the adaption of supply caused that this sudden growth in demand channeled first of all as an exceptionally rapid increase in prices.

The increase in housing prices started to accelerate in the end of year 1986. The growth continued uninterrupted until the second quarter of the year 1989. The timing of the turns in price development was - at least at quarterly bases - approximately similar in the Helsinki region and the rest of the country. Still, the growth was slightly faster in the Helsinki region than elsewhere. Nominal prices increased by 88 % in the Metropolitan Area of Helsinki while the growth was 83 % from 4/1986 to 2/1989. Faster growth in Helsinki was based on several factors: Employment growth was faster, unemployment rate was lower, population grew more and vacancy rate was lower than in other parts of the country. In addition, it is possible that investors with speculative interests had a bigger role in Helsinki than elsewhere.

In spite of the fact that price growth was based on real economic fundamentals, it also created expectations on the continuation of price increase. This attracted investors interested in capital gains. It is evident that the bubble effect based on expectations was not a major factor, it still existed and created its own addition to the price growth.

Rent control was still in effect. Real rents did not increase during the overheating period but the decreasing trend of real rents stopped. The stock of rental dwellings still diminished further when owners sold dwellings to get capital gains.

The increase of housing prices together with the decrease of real interest rates started a peak of free market housing production. It was activated with the

normal lag and consequently the top of completion was timed at the years 1989-90. The steepest growth concerned free market owner occupied housing but in addition to them the production of publicly financed rental housing was increased, too. The construction of office and industrial buildings appeared to be active at the same time. This led to overheating in the construction industry, manifested itself as the rapid growth of input prices and salaries. When related to housing stock construction activity was at highest level in the Helsinki region but the accelerating of production was experienced approximately at the same time in all regions, including rural areas suffering from migration deficit.

A paradoxal feature in the housing markets of the second half of the 1980s was that the growth of housing consumption did not accelerate but, instead, slowed down in 1987-89. Even this trend was experienced in all regions. In spite of the fact that households spent more money on housing markets than ever before, with the main aim to improve their housing and increase the living space, this target was not realised any better than before. On the contrary, the money pumped to housing markets led first of all to increase of housing prices.

In spite of the dramatic changes in housing markets in the second half of the 1980s housing policy did not change essentially. The production of arava financed rented dwellings was increased. At the same time the financing of owner occupied housing by arava was cut down. In the circumstances of over-heating there were conflicting effects connected with publicly financed housing production. On the one hand, the increasing construction of arava rented dwellings made the overheating of construction sector even worse. It also had a significant effect on the later over-supply of housing. On the other hand, in the situation when housing prices increased rapidly there were good reasons to add housing production to stop the price growth by increasing supply. No one of people responsible for housing policy was aware of the future economic depression. Rent control remained in effect, in spite of the active discussion about its effects.

The liberalisation of financial markets were carried out without including any actions to restrict the growth of housing demand. Consequently, in the economic situation the change caused a rapid growth of housing loans capitalising to housing values. The cutting of deductibility rights of interests in taxation would probably have dampen the growth of demand. This action was not taken then but much later in the year 1993.

The depression of housing markets in 1990-94

The growth of the Finnish economy continued until the year 1990. Both the volume of production and the number of employed started to decline in the middle of 1990. Soon the economy of the country collapsed according to all indicators. The bottom of the depression was reached in 1993. The production started to increase again in the last quarter of 1993 while the growth of employment started one year later. Unemployment rate increased rapidly during the depression, the top - 18 percent with EU standards - was reached in the beginning of 1994. Disposable income of households decreased significantly.

The activity of migration within the country slowed down and consequently, regional differences with respect to population development, after having increased in the second half of the 1980s, decreased. As a matter of fact, this development already started earlier, partly as a consequence of the overheating of housing markets: Migration surplus in the Helsinki region declined significantly already in 1989, after the price difference between the Helsinki region and the rest of the country had increased for several years. The migration deficit in rural areas and small urban areas decreased, respectively. The calming down of the domestic migration was compensated by in-migration from abroad, increasing rapidly since the year 1991, after the collapse of the former Soviet Union. Migration within the country started to accelerate again from the year 1993 on. An essential feature of the population development in the major urban areas in the depression was the population growth of centre cities at the cost of suburb municipalities. The depression turned the population growth inwards while the growth direction during the previous boom was outwards.

Real interest rates started to increase in 1989. From then on interest rates in Finland were most volatile and at a high level in average, partly due to international development of interest rates, partly because of domestic financial and exchange rate policy. Only in 1993 interest rates declined to a significantly lower level than during the previous four years.

The growth of housing prices stopped and prices started to decline in the middle of 1989, approximately one year earlier than production and employment. There were several reasons behind the housing price turn. Because of the production boom new dwellings came to market more than the

growth of demand required. Consequently, the vacancy rate of the housing stock increased and the sales times of dwellings in the market became longer. There were more and more unsold dwellings in the market. Another factor influencing price decline was the increase of interest rates. However, the first drastic interest rate peak appeared some months later in the end of 1989. Third factor was the increasing uncertainty because of the discussion on the problems of the Finnish economy and the volatility of stock markets. Housing prices started to decline approximately at the same time as share prices.

The decrease of housing prices continued until the end of 1992. After reaching the bottom prices turned to a modest growth in 1993 but it did not last long and next year prices declined again to the bottom level. The new long-lasting price growth started only in the beginning of the year 1996. All together, nominal housing prices declined 50 percent at national level and 60 percent in the Metropolitan Areas of Helsinki from the top of 1989 to the bottom of 1992. The downward trend was started from the increase of the number of vacant dwellings and dying down of price growth expectations. In the next stage high interest rates were the main engine of price decline. After the start of the general economic depression the decline of employment, growth of unemployment and decrease of income shrank demand and caused price decline for several years. Finally, cutting the deductibility rights of interest rates in taxation in 1993 made the price decline to last longer by increasing real after tax interest rates of households.

Housing rents behaved differently from housing prices even during the depression. Real rents started to increase in 1990 and the growth continued during the whole decennium. The changes both in the supply and in demand affected rent development. Rents of new contracts were reliesed from rent control in 1992. The owners of rented dwellings raised rents to get them to profitable level after the years of rent control. High interest rates increased costs both in the free market and publicly financed arava-sector. This was compensated by higher rents. At the same time the demand for rented dwellings increased because there were a lot of shifts from the owner occupied to the rented sector due to two-dwelling traps and indebtness problems. Foreign migrants also increased the demand for rented dwellings.

The fall of housig prices and higher interest rates reflected quicly in housing production, first in construction permits and starts but later, with a lag in the volume of completed dwellings. The top with respect to completed

dwellins was reached in 1990 when housing prices already were falling. The number of completed dwellings shrank since the year 1991 and the downward trend continued until the year 1996. The collapse of housing production was dramatic: While the number of completed dwellings was 70 000 in 1990, the volume in 1996 was only 20 000 dwellings. The fall of free market production was especially drastic. In 1990 the number was 50 000 dwellings but only 5 000 in 1996. The majority of housing production during the depression years consisted of publicly financed arava dwellings and rental dwellings getting public subsides for interest rate costs. The surviving of the construction industry over the hard depression years was to a large extent based on publicly subsidied housing production.

Vacancy rates were at the top after the production boom in 1991. This was a significant factor causing the fall of housing prices. The collapse of housing production and the continuation of housing consumption growth caused that vacancy rates started to decline already during the depression years. In the Helsinki region the stock of vacant dwellings melted away within a few years. On the contraty, in rural areas vacancy rates remained at high level even after the depression.

Tenure structure changed remarkably during the depression. The proportion of rented dwellings turned and started to increase in the beginning of the 1990s, after a decline for several decenniums. There were several reasons for this development, as well. The fall of housing prices, the release of rent control and the reform of capital income taxation caused together that investing in rental dwellings became a profitable investment alternative. Vacant dwellings - many of them completed in the production boom - were taken to rental use. In addition, nearly all of the housing production during the depression years consisted of publicly subsidied rental dwellings. There was also a lot of both accumulated and new demand for rented dwellings.

Paradixically, housing consumption increased even during the depression years almost at the same rate as during the previous years of overheating. The growth rate of housing consumption started to slow down rather late, in 1994 when the economic depression already started to be over. In spite of the fact that there were dramatic changes in housing conditions of individual households, average floor space per capita increased approximately as fast as before. The development can be explained with several factors. Declining housing price made it easier for new households to enter the owner occupied

housing sector. At the same time the increase in the supply for rented dwellings opened doors in the rental sector easier than before. Housing allowances helped a major part of low-income households to stay in their previous dwellings or to move to a new one with same level, in spite or the growth of unemployment and fall of income.

In housing markets the depression hit hardest the households who had got deeply into dept after buying an owner-occupied dwelling when the prices were high. The increase of interest rates and the possible fall of income due to unemployment led many households to a situation in which it was impossible to pay interest rates and amortizations with current income. When housing prices fell the security values decreased below the value of the loan in many cases. In this situation many households were forced to sell the dwelling significantly below the earlier price by which the dwelling was bought. Some households ran deeply into dept after ending up in a trap of two dwellings. In addition, many enterpreneurs had the dwelling of the family as the security of firm's depts. Consequently, after a bankrupt of the firm the family lost in many cases its home. Households with serious dept problems fell in-between in the network of benefits and subsidies of the welfare society. New actions were not taken into use to help their situation.

Housing policy during the depression was mainly based on previous means of housing policy. The public support for housing production was continued and the volume of publicly financed production remained approximately at the same level as in the second half of the 1980s. This helped the housing production to avoid total collapse and at least some of the construction firms to survive. Construction costs were down and competition of the few construction works was hard. Consequently the quality of construction evidently improved compared with earlier years. The structure of the public housing construction finance was changed. The arava loans for new owner occipied housing was cut and in the middle of the 1990s they were cancelled almost totally. At the same time subsidies for interest rate costs of rental housing production were enhanced as an alternative for arava loans. The cutting of arava loans for owner occupied housing had good reasons from the point of view of the targetting of public support. On the other hand, in those circimstances one of the effects was that, the structure of housing construction became more one-sided because free market owner occupied production declined sharply at the same time. Consequently, during the depression housing

production consisted almost purely of publicly financed rental housing. This created structural problems in housing stock and population in several residential areas constructed during that time.

The significance of the housing allowance system as a mean of housing policy increased during the depression compared with earlier years. In the end of the 1980s only 3-4 percent of Finnish households received housing allowance and the proportion of housing allowances of all income transfers was small. For example in Helsinki where living in rented dwelling was more usual and rent level was higher than elsewhere in the country only about 2 percent of household received housing allowance. After the depression started the number of allowance receivers increased to three-fold within a few years. Government expenses of housing allowances increased to a new level. From the point of view of households living in the rental sector and the owners of rented dwellings the system functioned reasonably well, in spite of teh fact that it was no designed for such an economic crisis which was experienced in the 1990s. The system protected - at least satisfactorily - households of the rental sector from the consequences of the weakened ability to pay rents due to increased unemployment and decreased income. According to data available the number of homeless people did not increase essentially during the depression. Mass notices because of unpaid rents did not happen, in spite of the fact that many individual households ended up with serious difficulties. In addition to renters the system protected landlords both in the free market and in publicly financed sector from economic losses, having probably been realised without the housing allowance system, due to unpaid rents and increasingly vacant dwellings. Still, the housing allowance system did not help the situation of the households ended up in difficulties with depts.

Rents were released from public control in two stages. First, the control of new contracts was ended in 1992, and the rest - old contracts - in 1995. There were good reasonings for the release because rent control was the central reason for the dramatic fall of the private rental housing stock in the previous decades. As a consequence of this development properly functioning markets for rented dwellings were lacking in Finland. This may have been one reason for the exceptional volatility of Finnish housing markets. The timing of cancelling the rent control - especially the first stage in 1992 - can be considered successful because in that situation the action did not cause sharp effects of rent level. Rents increased during the first half of the 1990s but the

main reason was the increasing cost of interest rates. Gradually the owners of rented dwellings started to raise rents also to compensate the fall of real rent level during the earlier years.

The deductibility rules of interest rates in taxation were changed essentially in 1993. In the new system interest rates of housing loans are no more deducted from the taxable income as earlier. Instead, the proportion respective to capital income tax rate is deducted from the tax. The reform had two major effects. First, the new system is neutral with respect to income level while the old system was favorable for high income households having high marginal income tax rate. From the point of view of housing policy and income distribution policy the reform was reasonable. Second, the change cut the tax benefit from interest rate deductions with the consequence that rala after tax interest rate increased for an average household compared with the earlier system. In the circumstances when the trend of housing prices was downwards the reform lengthened the fall of housing prices and slowed down the the turn of prices. When evaluated afterwards the reform was good but its timing was failed. Five or six years earlier the reform could probably have dampened the growth of prices after the liberalisation of financial markets.

Housing markets in the new growth period in 1995-99

Production started to grow after the depression in the last quarter of 1993. Employment trend turned approximately one year later. Since the new growth started it has continued strong and stable. The industrial structure changed significantly in Finland during and after the depression, reflecting the orientation of the new growth with respect to industrials and regions. The new growth in the second half of the 1990s were led by technology brances and market services. Mainly for this reason the growth of production and jobs took palce first of all in major urban areas being at the same time the locations of the biggest universities.

The migration within the country accelerated since the year 1994. The new home municipality legistlation giving the right to students to become the inhabitants of their study municipality influenced population development especially in 1994-96. Still, the main reason for the new migration streams is in the ragional polarisation of labour demand, especially in the last years of the 1990s. The migration surplus in major urban areas increased and respectively,

the migration deficit in rural areas and smaller urban areas started to grow. Within the major urban areas the geographical distribution of population growth started to change again: The growth of central cities started to slow down while the orientation of the growth shifted again to surrounding municipalities.

Real interest rates started to fall in 1993 and the downward trend continued until the end of the decade. In spite of this real interest rates and also realö after tax interest rates of housholds remained positive.

Housing prices started to increase in the beginning of the year 1996, more than two years later than GDP and and more than one year later than employment. The turn was realised at the same time in the Helsinki ragion and the rest of the country. Since then real housing prices have increased continuously. There has been regional differences in price development, especially in Helsinki the growth has been faster than elsewhere. Still, housing prices have increased in all regions. In the end of the year 1999 real housing prices had increased above the average long run level of last 30 years but they were still about a quarter below the top level of the year 1989. The new price growth can mainly be explainde by the old fundamental factors, employment and income growth, fall of real interest rates and the decrease of vacancy rates due to low housing production of previous years. The regional polarisation of price development follws from the differences in the regional development of jobs, population and vacancy rates. It must be noted that in rural areas vacancy rates have increased during the last years of 1990s.

Real rents increased all the time during the second half of the 1990s due to demand growth. This was the first period after the 1950s when housing prices and rents went approximately to the same direction, and even for basically same reasons. Rent control in the free market sector was finally finished in 1995. This made it possible that demand pressure is reflected in rent level.

The permits of housing construction started to increase in the end of 1996 and construction starts in the beginning of 1997. Respectively, the volume of completed dwellings has grown since the last quarter of 1997. Still, housing production was below the long run average at the end of the decade. There were significant regional differences with respect to housing production activity after the depression. In the Helsinki region and other major urban areas housing production has returned to a reasonably high level. Instead, in rural and small urban areas the production has remained at low level. The growth of

production is based on increasing housing prices and lowered interest rates. In the Helsinki region the lack of land available for construction has restricted the growth of production to the level needed to satisfy the demand.

Vacancy rates decreased in after the depression due to housing consumption growth and low volume of housing production until the year 1996. After that the decline stopped, at least according to the housing stock statistic. The development of vacancy rate started to deviate regionally immediatelly when the depression started. This trend has continued even after the economy started to grow. In the Helsinki region about 4 percent of total floor space of the housing stock was vacant or temporarily occupied in 1998 while in rural areas the proportion was nearly 8 percent. When it is taken into account that these figures include temporarily occupied dwellings, second dwellings, vacation houses, dwellings owned by firm and used as substitutes for hotel rooms, dwellings merged with adjacent dwelling, and even demolished units, it can be estmated that vacancy rates are 2-3 percent points lower than the above figures based on housing stock statistic. The differentiation of vacancy rates between regions gives a reason to anticipate that also the regional polarisation of price development will continue.

The development of housing consumption has been surprising during the depression and the following growth period. In 1991-93 - during the years of deepest depression - the floor space of the occupied housing stock increased nearly by 2 percent annually. Instead, since the year 1994 - when the new economic growth started - the annual growth rate has fallen below 1.5 percent. The trend is the same in all regions, in spite of the fact that differences with respect to the growth rate have widened compared with earlier years. Regional differences are the most stricking with respect to floor space per capita. In the Helsinki region the growth of housing space per capita has almost stopped since the mid 1990s while in rural and small urban areas the growth has continues at the same rate as before. Paradoxically, in the end of the 1990s floor space per capita is significantly lower and in rural and small urban areas clearly higher than the average of the country. The tightening of housing markets in the second half of the 1990s was reflected in the number of homeless people starting to grow after the depression, according to data available.

The public support to housing production in the form os arava loans and interest rate subsidees still has a central role in housing policy after the

depression. The volume and proprtion of publicly financed housing production decreased in the second half of the 1990s for several reasons. The change of financial markets has opened new financing channels for housing production and consequently the relative advantage of arava loans has weakened. At the same time the rise of housing prices has improved the profitability of free market housing production. In addition to construction firms the non-profit-making developing organisations have shifted their orientation to free market production. Increasing land prices and construction costs make it difficult to keep the costs of construction projects wthin the cost limits of arava production, especially in the Helsinki region. Finally, municipalities have become increasingly suspicious against the production of social rental housing.

The role of the housing allowance system has remained central even after the depression. The number of housing allowance receivers has decreased after the depression but slower than could be expected on the basis of lowering unemployment figures. The costs of housing allowances for the public finance have not turn down in the second half of the 1990s. The main reasons for this are the increase in the number of households living in the rental sector, increase of the rent level and the migration to major urban areas where the living in rented dwelling is more usual and rent level is higher than in other areas.

8   CONCLUDING REMARKS

The basic feature of the Finnish housing markets in the 1980s and 1990s were the dramatic changes in housing prices and construction. A major boom developed in the last years of the 1980s. It was followed by a sharp collapse of prices and construction in the beginning the 1990s and a gradual recovery a few years later. Despite of these swings, housing consumption has been growing in a rather stable manner over the whole period.

Regionally the basic trends in the housing markets have been quite similar until recently. The strong variations in prices and production were experienced approximately at the same time in all regions, although the development has been more volatile in the Helsinki region than in other parts of the country. The trends in housing markets started to deviate regionally around the beginning of the recovery. Regional differences in housing prices, housing production, vacancy rates and housing consumption have started to increase substantially: demand and prices increase strongly and vacancies decline in the big urban areas, while an increasing fraction of housing stock becomes vacant in the rural areas. Although construction activity is also concentrating in the big urban areas, it is not sufficient to prevent the differences in vacancy rates and prices from emerging in response to large demand shifts.

Housing markets are closely connected with general economic conditions. Housing markets react and adapt to changes in production, employment, income, interest rates, inflation and population growth. At the same time, the housing sector is a part of the national economy. Housing consumption is a major component of household consumption and thus also a very significant determinant of welfare. Housing investment is a large and volatile part of total investment. On the other hand, changes in housing wealth strongly influence households' consumption and borrowing behaviour.

According to the econometric analysis carried out in this study, housing consumption depends on the size and structure of population, permanent income of households and user costs of housing. Housing production at regional level depends basically on two factors, the real housing price and the real interest rate. Both prices and interest rates influence the production with a lag, because of the time required from decision making to completion of new dwellings. In addition, local supply restrictions, particularly those related to the availability of suitable lots, affect the regional construction activity.

Housing price development at regional level can be explained primarily by regional factors such as employment, income and vacancy rate, but also by real after-tax interest rate is important in all regions. In addition to these fundamental factors, lagged price change affects positively current price change. This property suggest of the existence of price bubbles, i.e. that price increases generate expectations of further increases. However, this effect is not especially strong, at least in the annual data used in the analysis, and it explains only a small fraction of the dramatic price changes in the 1980s and 1990s.

Strong changes of housing prices and housing production cause problems both for households as consumers of housing services and for developers, construction firms and owners of rented dwellings as suppliers of housing services. Volatility increases the risks associated with housing investments. High and volatile prices cause problems especially for potential entrants to the owner occupied sector. They are typically young households without big initial capital. High prices lead to excessively low housing consumption or alternatively to high indebtedness with the associated risks. Declining nominal housing prices can be a major problem, if one for one reason or another has to sell the dwelling at an inapproropiate time.

Because housing prices and the production of new dwellings are closely related, major price changes cause significant variation in production. Consequently, turnover, capacity utilisation and the sector's employment also vary strongly. This creates unnecessary costs and inefficiencies in the industry. In addition, the quality of production is likely to suffer in times of rapid growth of construction activity. The types of housing units designed may not be optimal from a longer time perspective, materials used may be of sub-normal quality, available labour may lack the necessary skills, and the heated market condition may induce constructors to ignore quality control.

It is thus evident that the stability of housing markets - a stable development of housing consumption, prices, rents and production - is a valuable aim from the point of view of households, construction industry and the public sector. However, the means of housing policy to control housing market fluctuations seem limited. Production, employment, income, population, interest rates and inflation are the fundamental factors influencing the housing markets but their development is mainly determined by factors which are outside the reach of housing policy.

Demand for housing can be influenced to some extent with the instruments of housing policy. The main means are tax rules (for example the deductibility of interest payments in taxation, capital gain taxes etc.) and direct subsidies such as housing allowances. However, there are many problems involved in the use of such instruments. First, there is always the risk of bad timing. If an action becomes effective at a stage when the upward trend already has turned, the policy can in fact accelerate price fall. The result then is increased rather than decreased volatility. The typically drawn-out process of decision making can aggravate these problems. For example, expected future cuts in tax breaks may increase current demand and thereby in fact lead to higher prices, at least temporarily, even if the objective was quite the opposite.

Second, if measures to dampen demand remain in place for a long time, a situation of suppressed demand is likely emerge leading to a violent increase in prices when conditions change. This was very likely an element in the overheating of the housing market in the late 1980s. Growth of housing demand had namely been restricted in Finland for decades with various means (lending control, rent control, arava restrictions, strict planning policy in cities etc.). Even currently the risk is there, as there is less floor space per capita in Finland than in most other West-European countries.

Third, the regional differences of housing market conditions cause additional problems. The same actions, which may restrict demand and slow down price increases in fast growing regions, may cause significant problems in other areas. For example, currently the housing market conditions are quite different in the Helsinki region from those of typical smaller cities not to speak about rural areas.

Supply control includes i.a. public support (subsidised lending and/or interest subsidies) to housing production and various actions to influence the supply of land for construction. The importance of the former measures has declined after the liberalisation of financial markets, as the availability of financing is not any more a major problem. In addition, the need to consolidate public finances has reduced the scope for massive production subsidies. In contrast, the availability and cost of land for construction is a key issue in many areas. This is especially true in the Helsinki region. Sufficient supply of vacant land is a necessary precondition for the adaptation of supply to changes in demand even in the long run.

Housing markets play a role also in regional development. When making migration decisions, people undoubtedly take into account the housing market conditions – availability of preferred types of dwellings and their cost – in alternative regions. Thus regions which provide good housing conditions at reasonable price are in principle in a better position to attract people than other areas.

Nevertheless, this effect has its limits. It can only affect choices between relevant alternatives. Surveys and observed migration patterns suggest that long-distance migration has in Finland been motivated mainly by job opportunities (employment as opposed to unemployment as well as career opportunities) and educational opportunities. In recent years, employment growth has concentrated in a few growth centres, typically around university towns. This has led to large-scale migration into these areas, and as a consequence to very tight housing market conditions. So far, the housing market conditions do not appear to have had a major restraining effect on the level of net migration from the labour market areas losing population to those gaining population. The main impact appears to have been a somewhat widening geographical size of the growth centres, as tight housing market condition have increasingly induced people to settle in areas further from the core.

The situation may nevertheless be changing somewhat. In many "foot-loose" industries, the location and growth of firms is likely to depend heavily on the availability of key competencies. If the people possessing the critical qualities do not find satisfactory housing conditions in the existing growth centres, firms may be induced to move to or increase production in the preferred localities.

Heikki A. Loikkanen wrote in 1989 an article with title "Housing – an everlasting problem". Now, in the beginning of the new millennium it is still an appropriate final statement for this study, unfortunately.

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