

Monetary transmission in Hungarian Housing Market

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Abstract

As part of the monetary transmission studies of the Magyar Nemzeti Bank, this paper attempts to analyse the role of the housing market in the Hungarian monetary transmission. The housing market can influence monetary transmission through three channels, namely the characteristics of interest burden of mortgage loans, asset (house) prices and the credit channel. The study summarises the experiences of developed countries, paying special attention to the issues arising in a monetary union. The developments of the Hungarian housing and mortgage markets in the last 15 years are highlighted, together with the expected developments and changes until EMU accession. Using panel econometric techniques the study investigates the link between macroeconomic variables and house prices in Hungary and the effect on housing investment and consumption through wealth effect and house equity withdrawal.

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I. Motivation

Housing is an everyday-part of households' life, however, it may be the most complex phenomenon as well. On the one hand, dwellings can play several functions. Besides the most traditional 'roof over one's head' function they could be a source of wealth accumulation, a valuable item as a heritage, an investment form etc. Another distinctive characteristic of housing is its major weight in households' wealth implying special role in households' decision making. As a result, shocks to housing market could have serious impact on households' behaviour and thus on the whole economy.

On the other hand housing market is more complex than consumption goods market. Not only do standard actors appear but also several other institutional circumstances, such as mortgage system, governmental subsidy plan etc., exist. Since the housing wealth is the major part of households' total wealth it is crucial for 'regulatory powers' to understand the mechanism of housing market before changing the institutional circumstances.

Due to the above-mentioned distinctive role of dwellings we attempt to analyse the effect of the housing market on the Hungarian monetary transmission, as a part of the monetary transmission studies of the Magyar Nemzeti Bank. Section II provides stylised facts about the housing markets of developed countries and gives a brief description of Hungarian housing market. Section III overviews the theoretical background of transmission through the housing market. In Section IV we carry out empirical work for the Hungarian economy to estimate the effect of interest rate on household sector's behaviour. Finally, Section V elaborates on the effects of the single monetary policy of the eurozone.

II. Stylised facts

This section first describes the main features of housing and mortgage markets in a set of mainly European countries and then attempts to show the relevance of these structural factors in the monetary transmission mechanism. The second part presents a brief history of the Hungarian housing market.

II. 1. Housing markets in developed countries

Monetary transmission depends on the type of the mortgage regime to a large extent. Mortgage regimes also play an important role in determining the key indicators of housing markets in developed countries. Three different types of mortgage regimes, namely fixed callable, fixed non-callable and variable, can be found in developed countries. Most countries can be characterised by the dominance of a particular type that historically became the most relevant. The following table, grouping the countries according to mortgage regimes, summarises the major characteristics of the housing and mortgage markets in a number of developed, mainly EU, countries.

Table 1. Key mortgage and housing indicators in developed countries (2001)

Countries	Dominant type of mortgage	Mortgage/GDP	Average LTV	Owner occupation
Denmark	Fixed callable	67%	80%	59%
US		58%	78%	68%
Germany	Fixed non-callable	47%	70%	39%
Netherlands		74%	112%	53%
France		22%	60%	58%
Italy		10%	55%	69%
UK	Variable	60%	70%	68%
Ireland		30%	60-70%	78%
Portugal		47%	70-80%	64%
Spain		32%	80%	85%

Source: ECB, OECD

The first observation that can be drawn from the table is that, despite their similarities in recent macroeconomic framework (low inflation, co-ordinated and stability-oriented economic policy), sound and liberalised financial systems, high standard of living, developed countries exhibit a surprisingly wide range of key indicators.

Analysing the countries individually, the Denmark and US belong to the first group, which can be labelled as fixed callable mortgage markets. Highly efficient and mature financial markets should be able to provide mortgage loans that have fixed interest rates for up to 10-15 years and should have the flexibility that is needed for the early repayment of long mortgage loans. It is thus not surprising that very few countries belong to this group. Both the US and Denmark have above-average owner-occupation rates, as well as a very high mortgage/GDP ratio, indicating the significant role of mortgages in the economy.

The second group consists of countries where the majority of the mortgage loans have fixed interest rates, but early repayment is constrained by high fees. Most of the continental European countries belong to this category, which can be further split into two subsets. The first subset is represented by Germany and the Netherlands, with both countries having a high level of mortgage loans. The historical commitment of policymakers to price stability in these countries has created a favourable environment for high turnover at low and fixed long-term interest rates. In other aspects, however, the two countries have some extreme features: the ratio of owner occupation is the lowest in Germany among all the countries in our survey, while the Netherlands has the highest LTV ratios, on average exceeding 100% in the case of new mortgages.

In the second subset of countries with long fixed interest rates, the mortgage loans do not play an equally significant role in the economy. Mortgage debt has been traditionally low in France and Italy, at 22% and 10% of the GDP, respectively. These low levels cannot be attributed simply to liquidity constraints during previous periods of high and volatile inflation, since these countries did not register rapid growth in the past years of eurozone membership. The relatively high level of owner-occupation rates in these countries and the low mortgage levels point to clear differences among households across countries in terms of preferences towards indebtedness. In contrast to the situation in the US or Germany, families in France and Italy do not have a strong tendency to rely on the financial system solving housing problems.

The mortgage markets in the third set of countries are characterised by variable interest rates. The UK has been the most traditional example of variable rate mortgages, with a high mortgage ratio (60% of GDP), close to those in the first group. Apart from the UK, the fast growing mortgage markets of Portugal and Spain are also dominated by variable rates. These eurozone members benefit from the low interest rates, considering that, prior to the nominal convergence, the high interest rates generated liquidity constraints for the majority of the households. In Portugal, the mortgage debt/GDP ratio was 47% in 2001, equal to that of Germany, while a decade earlier, it was comparable to that of Italy (12%). It is worth noting the difference in household preferences between Portugal and Italy: while both countries had experienced significant liquidity constraints prior to eurozone membership, and now as euro members face the same interest rates and economic policy framework, households in these two countries responded entirely differently to the adoption of the euro.

Evolution of the main indicators

Looking in more detail at the dynamics of the mortgage markets, the financial deregulation of the '80s may be considered a good starting point. In the overwhelming majority of the EU countries, the deregulation of the mortgage markets started in the 1980s, proceeding at different speeds across countries. The major steps generally included the abolition of interest rate ceilings of mortgage contracts on the one hand, and credit controls and contractual restrictions on the other. Further measures were taken with the aim of liberalising the entry to mortgage markets and the securitisation of mortgage loans.

In the short run, however, the quite similar deregulation measures did not lead to similar mortgage markets, but rather widened the set of available choices for new contracts in most countries. The primary reason why mortgage markets could keep their national characteristics for long was the very long maturity of the typical mortgage loan. Apart from the fact that deregulation can take effect only gradually through new contracts, the slow changes may be attributed to other factors as well. One explanation may be that the significantly different histories of inflation, and thus nominal interest rates, still has an impact on household decisions. Another reason may be the cultural differences across countries, as the example of Italy shows.

In the following sections, we attempt to highlight the most relevant trends of mortgage markets in the last decades and to present the stylised facts illustrating the interplay of mortgage markets with other key macroeconomic variables.

Due to the huge size of a housing loan as well as the need for sound collateral, mortgage loans should constitute a big portion of household debt in most developed countries, as the ratio of mortgage debt/total household debt varies in the range of 0.4-0.8. Apparently, higher weight of mortgage loans in indebtedness induces higher role of mortgage loans in the economy (measured by mortgage/GDP ratio).

The mortgage/GDP ratio has increased substantially during the last 20 years in most of the developed countries. While in the early '80s, the mortgage/GDP ratio exceeded 50% only in a few countries with the most developed mortgage markets, like Denmark and the UK, by 2001, nearly half of the countries in our sample recorded ratios around or above 50%. The average growth rates have varied through both the different periods and also across countries. As we have already mentioned, the most dynamic growth in our sample was shown by Portugal during the '90s, with an average growth of the mortgage/GDP ratio of 15% per annum. Spain also recorded in this period an annual

growth rate above 10%. For the entire period of 1980-2001, the highest growth rate was slightly less, at 10%, also recorded in Portugal. On the other hand, there was basically no growth in the mortgage/GDP ratio in France during the entire period.

Analysing the dynamics of the mortgage/GDP ratios in a macroeconomic context, the changes can, to a large extent, be attributed to two major macroeconomic factors: changes in real house prices and interest rates, and the deregulation of the mortgage markets.

It is worth looking at the stylised facts of the interrelation between mortgage and house price growth in different countries (see Figure 1). The EU countries provide a wide set of combinations: while in Portugal the most dynamic growth of the mortgage/GDP ratio has not been accompanied by any growth in real house prices during the '90s, in Germany, where the mortgage/GDP ratio was already high in the '80s, real house prices were rather decreasing in the second half of the '90s, parallel with a mild increase in the mortgage/GDP ratio. Italy and the Netherlands show a third type of relationship: house prices and mortgages have been positively correlated. In Italy, house prices and the mortgage/GDP ratio showed a cyclical pattern following the economic cycle, the correlation having been broken by the yield convergence prior to the euro adoption which resulted in a pronounced growth of the mortgage/GDP ratio. In the Netherlands, the two indicators were growing basically parallel during the entire period, with a faster house price growth at the end of the period.

Changes in the nominal mortgage rates had a clear effect on mortgage dynamics. Obviously, the nominal interest rate of the mortgage debt plays a crucial role in determining the liquidity constraint of households (see greater details later). Mortgage interest rates decreased during the '90s in all countries, reaching historically low levels in a number of countries. The decrease in the nominal rates could be attributed partly to cyclical effects, which generated very low real interest rates globally from 2002 and, more importantly, for a number of countries to a drop in inflation rates. The latter was especially significant in the case of South European eurozone countries during the nominal convergence process (see Figure 2).

The following table illustrates that the change in mortgage interest rates eased liquidity constraints significantly in all countries, and it had the greatest effect in the case of Portugal, Spain and Italy, explaining to a large extent the growth in the mortgage/GDP ratio.

Table 2. Effects of decreasing yields on the liquidity constraint¹

Country	Change in the liquidity constraint (monthly income)
Portugal	20,6
Spain	20,2
Italy	19,6
UK	9,8
Germany	6,8
Denmark	10,1

The relevance of the effect of the nominal interest rate on mortgage dynamics can also be seen in the debt service of mortgage loans compared to their disposable income. As Figure 4, which was taken from the ECB, shows,² the mortgage debt service/disposable income ratio has increased only modestly in most countries, despite the more dynamic growth of mortgage/GDP ratios, due to the substantial easing effect of the lower nominal interest rates. Regarding the effect of decreasing nominal and real interest rates, a similar conclusion can be drawn for the biggest developed countries by the BIS (Debelle (2004)), based on calculations of debt service of total household debt.

House Equity Withdrawal

In practice the house equity withdrawal became an important channel of transmission mechanism in the last decades in a number of developed countries, parallel with the liberalisation of the mortgage markets. However an earlier study (Iacoviello and Minetti, 2000) investigating the more traditional sub-channels (bank lending and balance sheet) of the credit channel, using the data of four European countries³ in the '80s and most of the '90s, show that there was a rather weak credit channel in the housing market. The authors, contrary to those emphasising the importance of house equity withdrawal, came to the conclusion that the credit channel can be more important in countries with a heavily regulated, rigid mortgage market and very weak in a competitive mortgage market with strong financial innovation, like the UK.

There are very different patterns in housing equity withdrawal, both significantly positive and negative values can be found in the EU. This might look less straightforward given that housing asset has a relatively stable ratio of total household wealth in the four biggest EU countries⁴. On the one hand house equity withdrawal was equal to 3% of disposable income in the UK, during the '80s and the '90s. According to the OECD (2004), house equity withdrawal was also positive in the Netherlands in the '90s and was around zero in Denmark. On the other hand, house equity withdrawal was significantly

¹ The effect of changes in the yields is calculated by taking the difference of the liquidity constraint with interest rates prevailing in 1995 and 2002, assuming a 20-year-maturity and 1/3 of disposable income is spent on the loan amortisation.

² This is only a rough estimate of debt-servicing-to-income ratio, particularly as it applies the mortgage interest rate of new contracts to the whole stock of mortgage debt

³ Finland, Norway, Germany and the UK

⁴ The ratio, according to HM Treasury (2003), is between 0,31 (in Italy) and 0,4 (in France), with Germany (0,32) and the UK (0,34) in between. Assessing these ratios one has to keep in mind that the definition of households' total asset is not strictly comparable internationally due to *e.g.* differences in pension schemes and therefore the size of pension funds.

negative in Germany, Italy and France during the '90s, in these countries households increased housing wealth on average by 6% of disposable income.

The experience of the UK shows that house equity withdrawal became significant after the beginning of the liberalisation of the mortgage markets in the early 1980s, and had increased during the entire decade reaching 8% of disposable income by 1989. Apart from the liberalisation of the mortgage markets, the UK experience also supports the concept that the number of transactions also plays an important role in house equity withdrawal. In the UK the transactions as a percent of owner occupied housing are about twice as high as the EU average, and it is also above average in the Netherlands and Denmark.

During the cyclical downturn of the last years, house equity withdrawal became an important macroeconomic issue in a number of economies. In the US, which can be considered as one of the best examples, equity extracted from owner-occupied housing reached \$700bn or near 9% of disposable income in 2002. A large part of this extraction, almost \$200bn, was related to the refinancing of existing callable loans. Low and decreasing mortgage rates undoubtedly motivated refinancing, especially given the low cost prepayment options in the US mortgage market, but financial innovation, increased flexibility required for house equity withdrawal also played an additional role. The importance of financial innovation can be underlined by the data showing that, while refinancing reached a magnitude of 3% of estimated total home equity in 2002, up slightly from the previous year, in no year prior to 2001, did cash-out exceed 1,75% of total home equity. An even greater part of house equity withdrawal, \$350bn, was related to the transactions of existing homes. No surprise that a record number of existing home sales, greatly encouraged by the low mortgage rates, were behind the very high level of transaction related house equity withdrawal. According to Fed estimates, mortgage originations for existing home purchases reached \$600bn, after subtracting repayment of home sellers, resulting in a net increase of \$350bn in mortgage debt, of which a considerable part was spent on goods and services. All in all the US evidence of the last years illustrate that monetary policy through housing equity withdrawal, provided a sufficiently developed and efficient mortgage market exists in the economy, can have a greater impact on household behaviour, thus on economic activity than previously.

Transaction costs, tax regimes

Considering that dwellings answer a basic human need, housing, is also an important area for economic policy. Governments in most countries take measures to influence the housing market, to pursue social goals, like improving the housing conditions for the low-income households. Government interventions also have implications for the monetary transmission. In the following paragraphs, based on the ECB (2003) survey, we focus on the interaction between government policies and monetary transmission.

Government policies include on the one hand subsidies, like provision of tax exemptions for housing-related expenses and direct subsidies to certain households, while on the other hand, governments levy transaction related taxes. Government measures, theoretically, have impact on the housing market at three levels: first, it influences the decision between investment in housing, moveable assets and consumption; second, the decision between owner-occupied and rented housing and finally choosing between new and existing housing.

Most EU countries have traditionally favoured home ownership, beside direct subsidies, through granting tax exemptions for mortgage interest payments and not taxing imputed

rents. Measures favouring owner occupation can have an adverse effect on the single monetary policy, as they decrease labour mobility within the eurozone, an important adjustment mechanism in the monetary union. The total amount of public expenditures on housing policies in the EU countries has not change significantly since 1980, on average it was around 0.6-1.3% of the GDP⁵. While public expenditures remained generally stable there were important changes in the structure of housing policy measures in most EU countries. A number of countries have moved towards more neutral stance in terms of investment decision between housing and movable assets, at the same time some countries increased the incentives towards owner-occupation housing.

Transaction costs not only can generate income for the government in forms of stamp and registration duties and inheritance taxes, but it is also used by governments aiming at containing speculative price movements. However higher transaction costs have adverse effects as well. It is obvious that higher transaction costs tend to decrease the number of transactions on the housing market, this relationship is well illustrated by the EU data. Belgium, with the highest stamp duties, reaching 10-12%, has one of the lowest transaction figures, while the UK with very low stamp duties (1-4%) has the highest transaction figures, as discussed before. Adding the connection between housing transactions and house equity withdrawal, it leads to the conclusion that government policies can constrain monetary transmission if it relies heavily on transaction related incomes.

II. 2. Short history of the Hungarian housing market

Hungarian housing market has been influenced by several effects and shocks in the last two decades. In the late '80s and the early '90s Hungarian households were afraid of economic breakdown thus they used real estate as the most important form of saving, resulting in peak house prices. Few years after the beginning of the transition households' fear was begun to alley and the process of restoring portfolio balance between real and financial saving was set off and Hungary experienced the so-called financial savings' miracle in mid '90s⁶.

At the beginning of the transition in the early 1990s, there was no mortgage market to speak of in Hungary. Although there was a considerable amount of subsidised housing loans during the socialist regime, the government decided to abolish the subsidy on account of the rising budget deficit, which attended the collapse of the centrally planned economy. Following the legal disputes over the termination of the subsidy for existing, long-maturity loans, the subsidised housing loans were converted into market-rate loans, significantly increasing the debt servicing obligations of households. However, debtors were given the option to repay the debt fully at highly advantageous discounted rates. Since many households chose the prepayment option, the outstanding amount of housing loans decreased to less than HUF 150 bn by 1991, equivalent to 6% of GDP. It decreased further in nominal terms, becoming insignificant, from a macroeconomic point of view, for almost a decade.

There were basically no new housing loans during the years when inflation was high and volatile. In 1991, the inflation rate peaked at 35%, remaining above 15% until 1998. In light of this, and considering the 1/3 prudential limit on debt service/disposable income,

⁵ These figures are not strictly comparable across countries, as some countries include forgone revenues in public expenditures, while other do not.

⁶ For more detailed description about this period see Zsoldos (1997).

households could thus not raise loans exceeding their 2-year-income⁷, even with nominal interest rates close to 15%. High and volatile rates of inflation in the first half of the '90s also led to the shortening of business contracts. Economic agents did not want to get tied down to long nominal contracts. This was particularly true in the financial markets. Even the Hungarian government could not issue long-term forint bonds; the 5-year government bond appeared in the market only in 1996. Considering that mortgage loans cannot have maturities longer than benchmark government bonds, the short yield curve also significantly constrained the potential growth of the mortgage market. In short, a confluence of factors hampered the growth of the mortgage market in the first years of the transition: high and volatile inflation, as well as low household demand for mortgages owing to declining real wages and rising unemployment.

The next period of housing market started in late '90s⁸. Economic consolidation began in the mid '90s. This was accompanied by increasing credibility in the economic policy committed to the fast nominal convergence path. As a result, long yields and the inflation rate declined continuously from 1997, parallel with the gradual extension of the benchmark government yield curve to longer maturities of 10 and 15 years in 1999 and 2001, respectively. These developments created the necessary financial background for the functioning of a mortgage market in Hungary.

Alongside these developments was the establishment of the legal framework for the Hungarian mortgage market. In 1997, the Parliament passed the Act on Mortgage Institutions. In line with this, new regulations in related areas, such as loan origination, foreclosure and prudential limits, were harmonized with the EU legal framework. However, despite improving macroeconomic and financial conditions and the institution of a legal and regulatory framework, the mortgage market remained stagnant until 2000 when the government introduced mortgage-related subsidies.

In 2000, more than 10 years after the loan subsidies were abandoned in the last years of the socialist regime, the government introduced interest subsidies to long mortgage loans for new housing constructions. The main rationale for instituting the new housing policy measures was the fact that the number of new housing constructions had been declining throughout the '90s. This decline was, to a large extent, due to the lack of house financing: households could rely only on their savings to finance housing investment.

These early measures promoting only new housing constructions did not have a major macroeconomic impact. However, they did give impetus to the previously inert mortgage market. In 2000, the households' mortgage/GDP ratio started to post some growth. To further foster this growth, although to a smaller extent, the government extended the subsidy to buying existing dwellings, as well. Meanwhile, macroeconomic conditions had also become favourable: the inflation rate dropped below the 7% target at end-2001, while the yield curve showed a steep negative slope, reflecting investors' confidence in the profitability of the convergence play strategy in the Hungarian government bond market. The new government measures, along with the favourable macroeconomic conditions, resulted in a gradual increase in mortgage loans, with an average of HUF 15 bn of new loans granted in 2001. However, the outstanding stock by the end of the year still did not exceed 2% of GDP.

⁷ Due to the effect of high interest rate on the liquidity constraint of a household, assuming a 20-year maturity and that 1/3 of disposable income is spent on the loan amortisation.

⁸ The early stage of this period is discussed at Valkovszky (2000).

The year 2002 brought dramatic changes to the mortgage market. Government subsidies directly targeting households were increased significantly at the beginning of the year. Moreover, through subsidies linked to funding costs, bank margins climbed to 8%. Meanwhile, the subsidy scheme was exhibiting a rather unusual feature: the interest burden of households was not sensitive to market rates; all interest rate risk was with the central budget. The most general mortgage type was a 15-20 year loan, with the interest rate fixed for 5 years, and a cap on interest paid by households at 6% for existing dwellings and even lower for new constructions. These rates were even significantly lower than benchmark government yields at that time.

This subsidy scheme was clearly not going to be sustainable. Under this scheme, even households, which would otherwise not have considered taking on a mortgage loan in the near future, were applying for loans simply to take advantage of the favourable conditions. This resulted in such a sudden and significant rise in mortgage loans that, by the middle of 2002, the mortgage market had started to post exponential growth. In the second half of the year, the volume of new loans originated in 2 months exceeded the total volume originated in the previous year. However, the government was slow to respond. It decided to cut the subsidies substantially only in December 2003, amidst serious concerns of the external and internal stability of the Hungarian economy.

The tightening measures primarily attempted to cut the budget expenditures on interest rate subsidies. Given the lower subsidies for the new loans, the profit margin of the banks decreased parallel with the significant increase in the interest burden of the households. Furthermore, the changes to the subsidy scheme brought two new features: mortgage rates became partly linked to market rates, and the difference between subsidies for new and existing housing widened from 1 to around 3 percentage points.

From the transmission point of view, the most relevant change was the establishment of the link between the mortgage rate faced by households and the market rate. The reason why tightening measures had immediately a great impact on the demand for new loans may be attributed not only to the fact that subsidies were significantly cut but also to the unfavourable market developments. As concerns about the external and internal equilibrium of the Hungarian economy increased in 2003, the long segment of the yield curve started to increase significantly, putting an end to the yield convergence that characterised long yields in the previous years.

As a natural consequence of the tightening measures and the high long rates, loan origination dropped significantly in 2004. At the same time, a new product appeared in the market: foreign exchange-denominated mortgage. Faced with the high forint mortgage rate, a growing number of households opted for mortgages with a lower nominal rate, notwithstanding the imminent exchange rate risk.

III. The theoretical background of transmission

In this part we display three main theoretical channels in which housing market and related economic forces influence the behaviour of households: (1) Interest rate channel: the changing mortgage interest rate alters the amount of monthly repayment, thereby influencing households' disposable income. (2) Asset price and wealth effect: housing investment can be considered as a form of investments or assets thus its prices and volume can be determined as of any other assets. Moreover, a rise in house prices implies increasing wealth, which makes higher consumption possible through the wealth effect. (3) Credit channel has a fairly similar effect, a rise in house prices increases housing

wealth and so the available collateral for loan, which, in turn, induces higher consumption expenditure.

III. 1. Interest rate channel

Monetary policy can have a direct effect on the behaviour of households through the interest rates of mortgage loans, providing a significant channel of monetary transmission. There are three main characteristics of mortgage loans that are relevant for monetary transmission. The most important characteristic is the low risk of a mortgage loan, which is reflected in the low risk premium. The physical characteristics of the dwellings, serving as collaterals, explain the low level of riskiness: dwellings are immobile and have a very long lifetime. The next characteristic is related to the size of the loans. Usually the mortgage loan is the largest loan in the portfolio of a household, representing a high ratio both compared to the value of the house and to disposable income. The third characteristic is long maturity, which on the one hand is feasible due to the safety of the collateral and on the other hand, long amortisation, due to the large volume, makes it necessary.

Despite the low level of risk, financial intermediaries set up prudential limits to mortgage loans. Due to volatility of house prices and the costs related to liquidating the dwelling of non-servicing debtors limits were introduced to maximise the loan-to-value ratios. For the monetary transmission, however, an other limit is more of interest, the one determining the ratio of monthly instalments to disposable income. As a general rule 1/3 of disposable monthly income is the upper limit for monthly instalments.

The nominal interest rate of the mortgage loan can be decomposed into three components, inflation compensation, risk-free real interest rate and risk premium of mortgage loans. For debtor households the real interest rate prevailing in the economy and the risk premium are equally relevant, together they determine the real cost of a mortgage loan. The third component, the inflation compensation also has an impact on the behaviour of the households. In other words, for the households it is not just the net present value of the cash flow that is important, but also the duration of the loan.

If nominal interest rate is high due to high inflation, then the ratio of inflation compensation is increasing within the monthly instalment and ceteris paribus the ratio of capital amortisation is decreasing. This implies that, in case of higher inflation, higher nominal monthly instalments are required to serve a mortgage loan with the same net present value. Monetary policy has to take into consideration that with the increase of the nominal interest rates more and more households will face a liquidity constraint due to the amortization/income ratio.

Similar to calculations in Section II, Figure 3 shows, taking the example of a 20-year loan, with fix nominal instalments, and 1/3 amortization/income ratio, the maximum amount of loan, expressed in terms of monthly income, as a function of the nominal interest rate. In case of 19% interest rate the maximum loan is less than 2-year-income, roughly one third of what is available at a 3% nominal interest rate.

In the followings we group the different kinds of mortgages loans, discussed at international examples, according to the link between key interest rate and mortgage rates. The long maturity mortgage loans can be divided into two major sets, based on whether mortgage rates are fixed or variable at the time horizon (2-3-year) relevant for monetary policy.

The shorter the interest rate period of a loan the effect of the key interest rate is becoming stronger. In case of variable rate mortgages, first, repricing occurs faster,

second changes in the key interest rate have a stronger effect on short rates. For monetary transmission therefore variable rate mortgages provide a direct and efficient channel.

If, on the other hand, rates are fixed for longer periods (say 5 years), than changes in the key interest rate can only have an indirect effect, through two steps. The first step involves the impact of changes in the key interest rate on the yield curve at maturities relevant for mortgage loans. It has to be taken into account that, in general, the effect is decreasing at longer maturities. The second step is related to the length of the period with fixed rate. Market rates are only relevant at the beginning of a new interest rate period, therefore have a gradual effect on the outstanding stock of existing loans, while they have an immediate impact on new loans.

There is one further feature, the possibility of early repayment, to be considered in case of fixed loans. When debtors can refinance with low transaction costs, having callable loans, than the transmission can become asymmetric. At times of declining interest rates debtors will take advantage of lower rates, decreasing monthly instalments and/or increasing the amount of the loan. There is an immediate reaction to lower rates. Increasing rates, on the other hand, do not imply any changes in the behaviour of households, as debtors keep servicing their loans with the original fixed rates. Monetary tightening has no immediate effect on households' behaviour, only at the beginning of the new interest rate period, as discussed above.

III. 2. Asset price and wealth effect

In theory the price of an asset is the net present value of future dividends (D), namely $P_0 = \sum_{t=1}^{\infty} E[D_t] / (1+r)^t$. Before we apply asset price theory for housing investment, we should rethink the role of dwellings.

In the microeconomic sense, a house is not simply a 'roof over one's head'. Arrondel and Lefebvre (2001) define the dual attitude of households' decision on housing: a source of housing services and an asset, i.e. housing is taken into consideration in investment decisions. Xiao Di (2001) examines the roles of dwellings in the USA, where one of these treats housing investment as a form of investment competitive vis-à-vis financial investment.

All in all, even if housing investment has several special properties, e.g. the requirement of a considerable amount of initial money, large transaction costs, uncertainty about quality, the uniqueness of every unit, relative illiquidity, long implementation time etc., it can be regarded as an investment form. The owner of a house can realise income from tenants and from changes in house prices. Increasing house prices can provide a higher return on real estate than financial investment does, and force households to reallocate their portfolios. In sum, despite the special properties of dwellings, actors are willing to buy or sell assets if such an activity is profitable irrespective of the type of the asset in question.

The determinants of house prices are examined in empirical literature as well (for instance see Cho (1996), Mayer and Somerville (1996)). Muellbauer and Murphy (1997) introduced the following equation for house prices:

$$P_t = g(H / POP, y, r, \Delta P / P, M, \dots) \quad (1)$$

where H , POP , y , r and M denote demand for housing, population, average real income, interest rate and proxy for credit/mortgage rationing. There are two noticeable points. First, Muellbauer and Murphy (1997) show a fairly stable house price to income ratio. Second, recall that return on housing investment (R) equals to $R = (E[D_{t+1}] + E[\Delta P_{t+1}])/P_t$ in asset price theory, which suggests that this return could be related to returns from any other investment form. Chen and Patel (1998) made this explicit by using the form of

$$p_t = \alpha + \beta y_t + \gamma E[r_{t+1} - \Delta p_{t+1}] + \delta DV_t \quad (2)$$

where DV and small letters denote demographic variables and the logarithm of corresponding variables. One should note that equation (2) can be considered as the long term of error correction model. Bank of England (2000) (hereafter BoE) model uses similar form in the long run house price equation, moreover, long run elasticity of income is restricted to one.

In first glance it seems these empirical shortcuts have no connection with asset price theory, however, Vadas (2003) showed that if one consider housing as an asset the theoretical price relation of portfolio choice model can be captured by error correction form. Based on the above-mentioned we could examine the effect of interest rate on house price by using error correction form not forgetting the asset price implication behind it.

Obviously changing house prices change the housing wealth thus influences households' consumption and housing investment decisions. In the case of consumption the BoE (2000) model uses the modified version of error correction consumption equation, originally suggested by Hendry and Ungern Sternberg (1981). In the BoE (2000) model, households' wealth consists of not only net financial but also housing wealth. When house prices rise, total housing wealth does so too, which implies a positive adjustment to consumption through the error correction mechanism. Case et al (2001) and Girouard and Blöndal (2001) also found empirically significant positive relationship between housing wealth and household expenditure. In order to simulate the wealth effect on consumption in Hungary we use the Hungarian Quarterly Projection Model (MNB (2004a)) in which the consumption function contains housing wealth and the housing investment function based on Vadas (2003).

III. 3. Credit channel

If mortgage repayment is tied to the value of collateral, namely dwellings, changes in house prices alter monthly repayment by changing the risk premium. Increasing house prices reduce, while decreasing house prices increase the risk premium. Thus, changes in house prices either increase or decrease the amount of monthly repayment, thereby influencing the ability to repay, and the possibility of default.

Several theoretical and empirical studies seek to incorporate these effects into their models. Westaway (1992) provides a comprehensive general equilibrium model, which incorporates the flow of housing services into the utility function. Aoki et al (2002) go one step further and use not only housing services in the utility function, but also apply the financial accelerator developed by Bernanke et al (2000). The main point of the financial accelerator is that house prices influence housing wealth that households can use as collateral in borrowing. If house prices increase, housing wealth and available

collateral do so as well. Consequently, households can borrow at a lower financial premium and/or increase their indebtedness.

The financial accelerator can be grabbed in two ways in empirical modelling. Financial premium of households' loan should be linked to housing wealth. Although it would be the best way, the identification of premium in consumption loan is quite dubious. The second way is to link household's consumption to housing wealth directly, however, in this case the wealth effect and the financial accelerator or credit channel is not separated. Due to the measurement difficulty of first approach we employ the latter one in empirical investigation.

IV. Transmission in Hungarian housing market

Besides the standard transmission channels, namely the interest rate channel and, as we indicated above, the joint wealth effect-credit channel, we display two other effects, which influence the monetary transmission in Hungarian housing market.

IV. 1. Interest rate channel

We expect mortgage loans to have a weak direct impact on households' disposable income in Hungary, for a number of reasons. The outstanding stock of mortgage loans is still low compared to developed countries, despite the dynamic growth of the last years. The key interest rate affecting the yield curve only has a minor impact on the interest burden of mortgage loans due to the features of the government subsidies effective until 2003. Apart from the government subsidies, the fixed rate mortgages dominating the Hungarian market result in a delayed effect of interest rate changes, similar to many eurozone countries. Due to the high level of domestic interest rates FX mortgages are becoming more popular, further weakening the monetary transmission mechanism.

Based on the evolution of the mortgage market and the government subsidy scheme discussed in Section II, the following table summarises the direct effect of interest expenditure on disposable income and the effect of a change in the market interest rate.

Table 3. Sensitivity of disposable income to changes in the mortgage interest rate

Year	Households' disposable income (bn HUF)	Mortgage interest expenditure (bn HUF)	Interest/Disposable income (%)	Sensitivity of interest expenditures to change (+100 bps) of the market rate (bn HUF)
2001	8913	18.4	0.21%	0.8
2002	9742	53.4	0.55%	2.2
2003	10863	95.4	0.88%	3.9
2004*	11950	132.2	1.11%	5.5

* Forecast

As it is apparent from Table 3 one percentage point change in market rate induces negligible change in the disposable income of household sector and thus in aggregate consumption expenditure.

IV. 2. Asset price, wealth effect and credit channel

To be able to determine the wealth effect of monetary policy on housing investment and private consumption we have to estimate the relationship between the interest rate and house prices at first. Using this price elasticity we can simulate (1) the effect of interest rate on house prices and thus on dwelling investment (2) the effect of altered housing wealth on consumption.

As we discussed earlier the house prices can be modelled in error correction framework. Previous studies used simple time series techniques, however, due to the short sample period, it is not a feasible approach in Hungary. Instead of using aggregated time series we apply panel data where the cross-sectional variance comes from the geographic separation⁹. Other deviation compared to equation (2) is to neglect demographic variables. Obviously demographic variables are essential to explain house prices when significant demographic fluctuation can be observed. Not only is our sample too short, quarterly observations for the period of 1997-2002, to expect such an effect but also we know that there was no considerable movement in Hungarian demography. As a result we estimate the following equation:

$$p_{i,t} = \mu + \gamma_1 p_{i,t-1} + \gamma_2 p_{i,t-2} + \beta_0 y_{i,t} + \beta_1 y_{i,t-1} + \alpha_0 r_t + \alpha_1 r_{t-1} + \alpha_2 d_{00} r_t + \alpha_3 d_{00} r_{t-1} + \varepsilon_{i,t} \quad (3)$$

where i represents the capital and the 19 counties of Hungary while p, y, r and d_{00} denote the house prices, GDP per capita, the interest rate of housing loan and a dummy variable which equals 0 before 2000 and 1 otherwise. This dummy is supposed to test whether government measures easing the access to mortgage loan has effect on transmission¹⁰. Equation (3) can be rewrite to the following form, which is a frequently presented form of ECM:

$$\Delta p_{i,t} = \mu + \theta_0 [p_{i,t-1} - \theta_1 y_{i,t-1} - \theta_2 r_{i,t-1} - \theta_3 d_{00} r_{i,t-1}] - \gamma_2 p_{i,t-1} + \beta_0 \Delta y_{i,t} + \alpha_0 \Delta r_t + \alpha_2 \Delta d_{00} r_t + \varepsilon_{i,t} \quad (4)$$

where $\theta_0 = \gamma_1 + \gamma_2 - 1$, $\theta_1 = -(\beta_0 + \beta_1)/(\gamma_1 + \gamma_2 - 1)$, $\theta_2 = -(\alpha_0 + \alpha_1)/(\gamma_1 + \gamma_2 - 1)$ and $\theta_3 = -(\alpha_2 + \alpha_3)/(\gamma_1 + \gamma_2 - 1)$. This specification allows us to test numerous assumptions. For instance whether the ratio of house price to income is constant ($\theta_1=1$), interest rate has a significant effect on house prices ($\theta_2 \neq 0$), government measures altered the transmission ($\theta_3 \neq 0$), sluggishness of house price growth ($\gamma_2 \neq 0$) etc.

In order to avoid estimation bias coming from a single estimator we chose four estimators from three different approaches. Firstly, since our sample contains cross-sectional dimension, we apply a standard dynamic panel estimator suggested by Anderson and Hsiao (1982). Secondly, as the other side, we also employ three stage least squares (3SLS), which is frequently used in time series researches. Since panel estimators, such as Anderson and Hsiao (1982), are appropriate when $N \rightarrow \infty$ and time series

⁹ We have generated quarterly data using the raw database of Hungarian Central Statistical Office (2003).

¹⁰ Since the government actions contains several steps there is no a single date to be picked up. As we argued earlier 2000 was the first year when subsidy measures were introduced and therefore households' mortgage/GDP ratio started growing.

estimators, such as 3SLS, are appropriate when $T \rightarrow \infty$ none of these estimators are fully suitable on our sample. In order to handle this we consider a ‘mid-solution’ when the cross-sectional and time dimensions are roughly equal. In other words neither N nor T asymptotic distribution is dominant. Pesaran et al (1999) suggest an alternative estimator for this special case called pooled mean group estimator.

Table 4 Estimation results

	Anderson-Hsiao		Pesaran-Shin-Smith		3SLS		
	Coef.	Z stat	Coef.	t stat	Coef.	P($\theta_i=0$)	
γ_1	0.820	4.02	θ_0	-0.068	-1.06	-0.153	0.00
γ_2	-0.293	-2.47	θ_1	0.972	10.06	1.065	0.00
β_0	0.860	3.85	θ_2	-0.028	-9.38	-0.031	0.00
β_1	-0.403	-1.76	θ_3	0.010	6.73	0.004	1.00
α_0	-0.003	-1.07					
α_1	-0.007	-2.71					
α_2	0.006	7.12					
α_3	-0.002	-1.56					
Long-run income elasticity (θ_1)		0.9655		0.972		1.065	
P(θ_1) = 1		0.787		0.775		0.317	
Long-run interest rate elasticity:							
- before 2000		-0.020		-0.028		-0.031	
- after 2000		-0.012		-0.018		-0.027	
Hansen J statistic		$\chi^2(4) = 4.41$ P = 0.353					
AR(2)		z = 1.37 P = 0.171					

Note: In case of 3SLS we applied Monte Carlo method to obtain proper distribution. Exogenous instrument variables are $p_{i,t-3}$, $p_{i,t-4}$, $y_{i,t-2}$, $sb_{i,t-1}$, $sb_{i,t-2}$ and $fb_{i,t-2}$ where sb and fb denote the new house starts and finished house constructions.

According to the estimation results the long-run relationship between house price, income and interest rate seems to be acceptable assumption. Every estimator indicates unit elasticity between house price and income i.e. the ratio of house price to income is constant. The only discrepancy between the panel estimator and the other two is the speed of adjustment. While it is reasonable in the case of 3SLS and Pesaran-Shin-Smith the Anderson the Hsiao indicates too rapid adjustment ($\theta_0 = -0.473$).

The interest rate elasticities before 2000 seem to be reasonable and are also close to each other. More interesting results come from the estimation of dummy variable. Contrary to our expectation, increasing interest rate elasticity after the introduction of government subsidies is not underpinned by the estimation results. Every method implies decreasing interest rate parameter, however, its magnitude is fairly small. On the other hand it is not significant in every estimators e.g. 3SLS strongly reject the change in interest rate parameter. There could be several reasons to obtain such a result. Firstly, the government subsidies were gradually increasing, thus it can be rather considered to be a flow of measures than a single step. Due to the relatively short sample period we did not want to extend the number of dummy variables since this must have distorted the estimation

results. To avoid that we choose the approximate start of the effect of government actions (see footnote 10). Secondly, the immediate cut in loan rate happened at the end of the sample. Obviously the adjustment of house prices takes a certain time which will continue in next years. Since the full effect of the sharp decrease in interest rate cannot be detected in the sample thus estimations cannot grab its effect properly. Finally, and most importantly, the changing variables have not imply different deep parameters. Note that lower interest rate does not alter the households' behaviour by itself. It simply increases the demand for credit. All in all, we believe that the whole sample should be considered and take parameters where they are significant.

Based on the estimation results we are able to simulate the effect of interest rate on relevant households' variables, such as housing investment and consumption expenditure. To achieve this we use Hungarian Quarterly Projection Model extended by our new house price equations. In order to obtain a complete interval we use the lowest (Anderson-Hsiao) and the highest (3SLS) estimation results. Nevertheless one should recall that the most probable outcome is likely to be within this interval as the more appropriate Pesaran-Shin-Smith estimator suggests.

Table 5 Transmission throughout wealth and credit channel

	House prices		Housing investment		Consumption	
long-run interest rate elasticity	-0.012	-0.031	-0.012	-0.031	-0.012	-0.031
1 st year average	-0.60	-1.14	0.00	0.00	0.00	-0.01
2 nd year average	-1.22	-2.89	-0.39	-0.56	-0.05	-0.11
3 rd year average	-1.19	-3.07	-0.70	-1.13	-0.11	-0.26
4 th year average	-1.19	-3.05	-0.70	-1.02	-0.14	-0.34
5 th year average	-1.19	-3.05	-0.69	-0.88	-0.13	-0.35

* 1 percentage-point permanent change in mortgage loan rate. Results are displayed as the percentage differences from baseline.

Table 5 displays the simulation results of one percentage point permanent increase in mortgage loan rate. Evidently, the house prices decrease 1.2 and 3.1 percentage. Decreasing house prices are only one source of decreasing housing wealth. Higher interest rate and lower house prices also discourage the housing investment. According to the simulation it could be around 1 percent. Lower house prices and dwelling investment alter the real wealth position of households, which should influence the consumption decision. Since consumption loan secured by dwelling is not so common in Hungary it is not surprising that decreasing housing wealth has moderate effect on consumption. One should keep in mind that the above displayed changes in consumption expenditure are induced by merely the housing market, we ignore any other relationship between interest rate and consumption.

IV. 3. 'Borrow more' effect

During the last years house equity withdrawal became an important macroeconomic factor, despite the unsophisticated mortgage products offered in the Hungarian market. The main reason behind the house equity withdrawal characterising the last years was the combination of the previously binding liquidity constraint of households and the subsidies available for existing dwellings.

The existence of the housing equity withdrawal, involving housing transactions, can be illustrated by an example. Households buying a more expensive apartment are selling their old one and taking up a mortgage loan with the highly advantageous interest rates. On the aggregate level, if the transaction involves only existing dwellings, there is no change in the net financial position of the household sector, as the mortgage loan equals to the increase in the savings of the seller. However due to the low interest rate, the household taking up the mortgage might consider to have a bigger loan, to finance consumption, say to furnish the new apartment. If LTV and debt service/income ratios permit households can significantly ease the liquidity constraint. Our previous calculations (MNB Inflation report 2004 February, MNB(2004b)) showed that 15-30% of mortgage loans raised for existing housing could finance consumption during 2001-2003, this equals to 0.5-1% of disposable income. It is therefore an important characteristic of the Hungarian mortgage market that housing equity withdrawal could exist, despite the unsophisticated mortgage products.

The evolution of the number of housing transactions also supports the growing importance of house equity withdrawal. (see Figure 6) The number of housing transactions has almost doubled in the last seven years, and in 2003 the Hungarian figure has already exceed the German and Belgian level.

IV. 4. Renting market

The renting market can have important implications for the monetary transmission. Renting costs are usually included in the consumer basket; therefore housing market has a direct effect on inflation. The Hungarian situation is rather special in case of the renting market, as there are hardly any apartments rented at a market price, reflected in the very high level (92%) of owner occupation. One reason behind the very high level of owner occupation is the fact that the majority of state-owned apartments were sold to tenants in the early '90s for a symbolic amount. Another possible reason why official statistics register a very small renting market is tax evasion. Landlords are obliged to pay a 20% tax after renting income, though this income, according to anecdotal evidence, hardly ever appears in the tax reports.

The non-existence of a statistically observable renting market led to a situation, where renting costs are substituted by different items in the Hungarian consumer basket. Market rents are substituted by a regulated price, the rents charged by local municipalities on dominantly social housing. The imputed rents of owner occupied housing are approximated by a weighted average of goods and services related to house repairing and maintenance. From a monetary policy point of view this substitution is rather controversial as largely different macroeconomic factors determine regulated prices, housing repair and maintenance goods and services on the one hand, and house-price-linked renting costs on the other. Therefore the monetary policy has to pay attention in the future that a switch to actual renting costs in the consumer basket will strengthen the transmission trough the housing market.

An additional aspect in this regard is the difference between the weight of rents in the Hungarian and the HICP basket: while the weight of housing rents is around 6% in the HICP excluding imputed rents, in Hungary the regulated rent is 0.1% and the imputed rent is 5.5% of the consumer basket.

V. On the way to the eurozone

We intend to pay special attention to the implications for monetary union, looking at the experiences of both current eurozone countries and possible new members.

For Hungarian monetary policy, prior to the accession to the eurozone, it is important to understand in detail the transmission mechanism of the eurozone. Focusing on the eurozone experiences is especially important in the case of a channel that is relatively new to the Hungarian economy, like the interaction between monetary policy and the housing and mortgage markets. Given the nominal convergence process of Hungary, experiences of the less developed eurozone countries can serve as useful benchmarks about expected future dynamics, both during the last years of the convergence process and for the expected effects in the early years in the eurozone. Furthermore, understanding the main features of the transmission mechanism in the eurozone could help policy makers to facilitate the convergence of the Hungarian housing and mortgage markets to structures prevailing in the eurozone.

The first characteristic of the transmission mechanism in the eurozone is related to the dominance of long term, non-collable bonds in the mortgage markets of the biggest member countries. As discussed previously, the dominance of long non-callable bonds results in a rather weak connection between the key interest rate and interest burden of the mortgage debt in the eurozone, and leads to a slow convergence of the main parameters of the existing mortgage stock across the different countries.

The heterogeneity of the structural factors, along with the differences in house price and mortgage dynamics, has important implications for the monetary transmission in the eurozone.

Prior to the launch of the single currency, some economists had serious concerns about the risks stemming from the differences in the transmission mechanism between interest rates and housing markets given the heterogeneity of institutional and market characteristics. Maclennan, Muellbauer and Stephens (1999) argued that, besides the initial heterogeneity even on the longer run, there could be considerable blockages to the convergence of the mortgage and housing markets in the unified financial markets, slowing down the process, which in certain countries might not happen at all.

The assessment of the structural factors in the EU housing markets (ECB 2003) based on the experiences of the first four years of the monetary union, emphasised that the heterogeneity prevailing in the mortgage markets of the eurozone countries moved from the country level to the household level due to the liberalisation of the markets. This implies that the transmission through the mortgage and housing markets in the eurozone will keep its heterogeneity in the long run. However, unlike before the adoption of the euro, it will rather change from household to household, as households can have access to a wider range of mortgage products for choosing what fits their preferences the best.

The ECB performed a comprehensive analysis of the monetary transmission mechanism in the eurozone (Angeloni et al. 2002), summarising the experiences of the first years of the single currency. The analysis was aware of the difficulties related to the short time series since the implementation of the euro and to the structural changes that might have happened due to the change in the monetary regimes of the member countries. Keeping in mind these caveats, the study has found that the interest rate channel is a very important channel of monetary transmission, although it is not exclusive in many countries. The bank lending channel was found to be significant in Italy and Germany, countries with heavily regulated mortgage markets, although at the eurozone level the results are against the presumption of a widespread and strong bank lending channel.

The overall effect of monetary policy on the real economy is comparable between the US and the eurozone. However, the components of GDP most sensitive to monetary policy are different. It is investment that is driving output changes in the eurozone, whereas in the US, much of the output adjustment seems to be stemming from changes in consumption. These qualitative findings are consistent with the assumption that flexible mortgage markets, such as those in the UK and the US, can strengthen the monetary transmission mechanism operating through households' consumption behaviour.

Among the most developed EU mortgage markets, the UK and Denmark are not part of the eurozone, as both countries have an opt-out from becoming a full member of the EMU. However, both countries have thorough analyses of how their transmission mechanism through the housing and mortgage markets would be affected by the adoption of the euro. What makes the comparison of the opinions of the two countries even more interesting is the fact that they are basically at the opposite end of the spectrum, in terms of mortgage regimes.

In the UK, as part of the very comprehensive assessment of the five economic tests for determining whether adoption of the euro would be in the interest of the economy, HM Treasury (2003) prepared a study on the implication of the housing market for the transmission mechanism. The conclusion of the study is that due to the structural differences between the UK and other eurozone housing and mortgage markets, the interest rate sensitivity of the households in the UK is greater. Thus, the optimal monetary policy for the enlarged eurozone might not be optimal for the UK. The study identifies four main structural differences: housing supply elasticity, level of mortgage debt combined with the dominance of variable rate mortgages, owner occupation rate and the level of competition and liberalisation of mortgage markets. The last point is the main reason behind the difference in house equity withdrawal, which has probably the most important macroeconomic effect for the difference between the consumption behaviour of UK and eurozone households.

Denmark has quite a different view of the possible effects of adopting the euro. Despite the structural differences between the housing and mortgage markets of Denmark and the eurozone countries, there are no serious concerns about the possible effects of adopting the euro. One reason for this is the set-up of the current monetary policy framework: the Danish crown is pegged to the euro with a narrow band in the ERM II regime and the interest rate policy of the ECB is rather closely followed by the Danish National Bank. Due to the monetary regime, the adoption of the euro would only mean slightly lower interest rates, given the 20-30 bps spread of Danish yields above euro benchmark levels. Based on the fixed exchange rate regime market, participants can hedge prepayment risk in the euro market without needing to hedge currency risk, although, the single currency could make hedging even easier in the Danish market.

Another reason behind the pro-euro stance is the limited difference between the transmission effects of the long callable Danish bonds and the non-callable eurozone bonds in empirical terms. As discussed earlier, an asymmetry arises between callable and non-callable types when the long rates are decreasing, making the re-mortgaging of callable bonds profitable. This happens usually when the economy is below the potential growth rate and the monetary policy stance is accommodative. In these cases the asymmetry would lead to a faster recovery through the higher consumption generated by the more favourable terms of the re-mortgaging, but it could not lead to overheating as there are basically no differences between the two mortgage types in times of increasing yields, tightening monetary conditions.

Apart from being aware of the importance of the national characteristics influencing monetary transmission even in a monetary union, one also has to keep the global forces in mind. A recent study, IMF (2004), argues that house prices are globally synchronised to a large extent, despite the extreme non-tradable nature of dwellings. The study using the dynamic factor model has found that in a set of 13 developed countries, global factors explained on average 40% of house price movements between 1980 and 2004. One theoretical explanation for the important role of global factors in determining house prices is that, apart from housing assets, a significant part of household wealth consists of internationally traded assets, so that rates of returns move in a coordinated fashion globally. Another reason, confirmed by the econometric results of the IMF, is that interest rates and mortgage/GDP ratios are correlated with the global housing factor, which captures common shocks affecting house prices in all countries of the sample. These results highlight the importance of monetary policy and the mortgage market in the housing markets of developed countries, strengthening the transmission mechanism of the single monetary policy in the eurozone.

All in all, in the eurozone, mortgage loans have a sizeable outstanding stock and the mortgage/GDP has been growing steadily, not least due to the effects of the convergence of nominal yields. On the other hand, the transmission effect of residential mortgage loans is rather limited, as the bulk of the loans in the biggest countries are made up of long, non-collable loans. Mortgage markets are liberalised, as reflected in the growing heterogeneity of the new contracts across countries. However, on an aggregate level competitiveness of the eurozone mortgage market is well behind that of the UK market, where households can have better opportunity for housing equity withdrawal can significantly ease liquidity constraints to smooth consumption.

Future dynamics of Hungarian mortgage market

In light of the international experiences it is also important to consider possible future dynamics until the adoption of the euro. In the followings we focus dominantly on the mortgage market for two reasons. First, the fastest changes among the structural factors are related to the mortgage market. Second, the adoption of the euro will obviously have the most direct impact through the mortgage loans.

As we are looking forward until the euro adoption it is straightforward to consider the experiences of current eurozone members. We have shown in the international experiences that Portugal and Italy are the two extremes in terms of mortgage market developments. Portugal was the typical example of a liquidity constrained market, where demand was growing extremely fast following interest rate convergence. In Italy, on the other hand, there was a rather moderate increase in the demand at the low euro rates.

There is however an additional consideration to keep in mind in a small open economy. As a significant part of the transmission mechanism through the housing market is related to the indebtedness of the household sector, the net financing position of the household sector has also to be taken into account. In other words, apart from the structural features, the sustainability of the net position of the domestic sectors, reflected in the current account is also a determining factor of the monetary transmission.

If there were only forint denominated loans available on the mortgage market than the dynamics of the new loan provision would depend primarily on the long yields' convergence. Given the loan conditions after the tightening of the subsidy scheme, the benchmark rates should drop some 300-400 basispoints to become similar to the level

pertaining to the heavily subsidised period of 2002-2003. This would also imply that due to the gradual process of yield convergence the growth in the mortgage market would be rather limited in the coming years, unlike the exponential dynamics in 2003. In this scenario the Hungarian mortgage market would become similar by time to those in most continental EU countries, where given the dominance of long fixed loans there is a weak impact of monetary policy on the disposable income of households, still there is a substantial growth in the mortgage/GDP ratio.

The response of the household sector to the tightening of the subsidies points, however, to a rather different direction. As we have mentioned before, FX loans are becoming increasingly popular among households faced by the higher forint mortgage rates. The strong mortgage demand suggests that Hungarian households are willing to pay a high price, namely the imminent exchange risk, to loosen liquidity constraint. The growing popularity of FX mortgage loans clearly has an adverse impact on the transmission of the Hungarian monetary policy on the one hand, as high domestic rates rather shift mortgage demand to FX loans, and leads to a build up of a non-hedged FX position, raising stability related concerns on the other. Furthermore monetary policy is left with very little room to manoeuvre if there is a strong demand for FX loans, as lowering interest rates, which would make domestic rates more competitive will also lead to a weaker exchange rate in a UIP framework, which in turn could give an additional impetus to FX loans, as exchange rate risk is decreasing, taking into account the features¹¹ of the Hungarian exchange rate regime.

¹¹ The Hungarian forint is pegged to the euro with a +/-15% band.

VI. References

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VII. Appendix – Figures

Figure 1. Real house prices and mortgage/GDP growth in selected eurozone countries (1995=100)

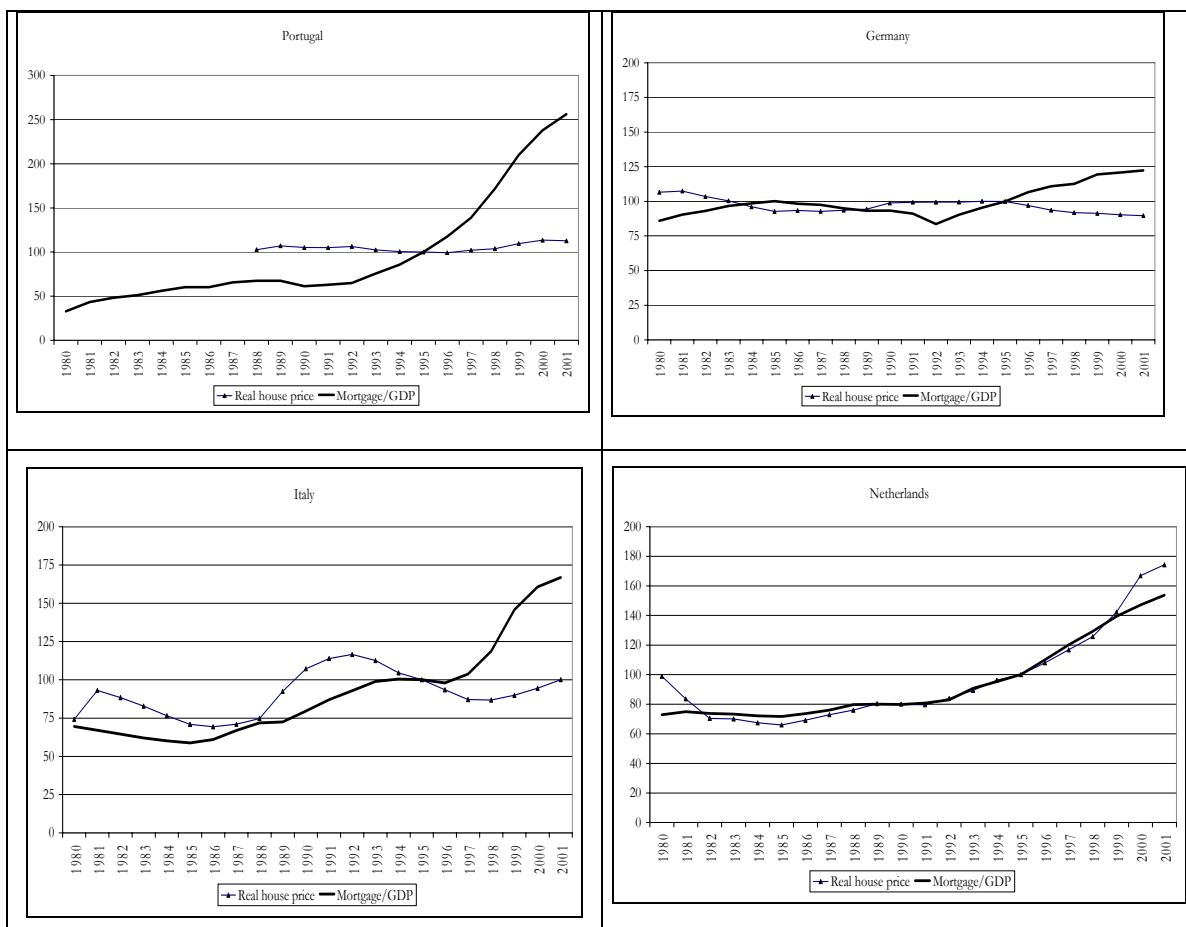
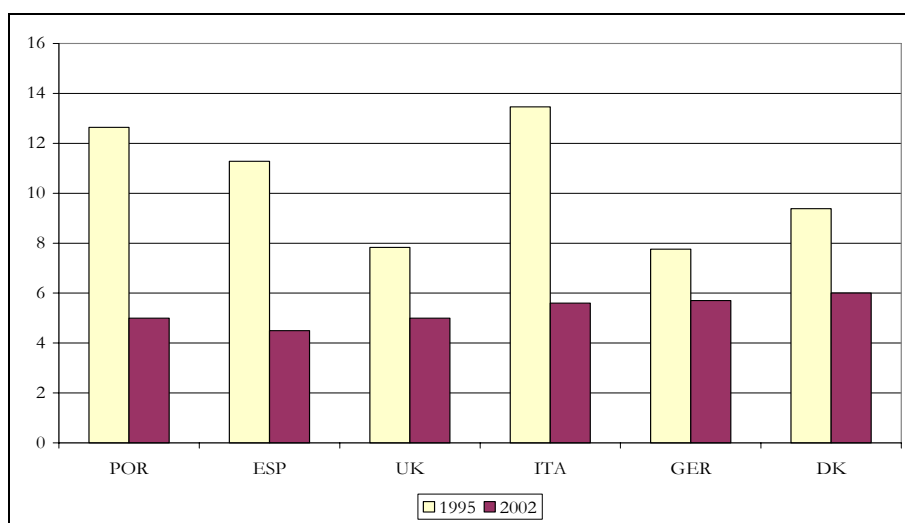


Figure 2. Convergence of mortgage interest rates



Source: ECB, HM Treasury

Figure 3. Credit constraint and nominal interest rate

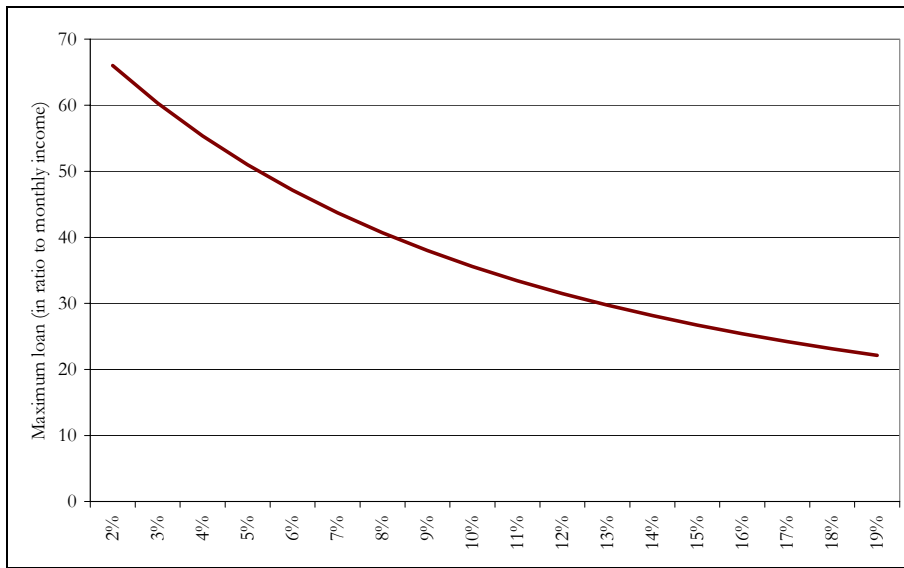
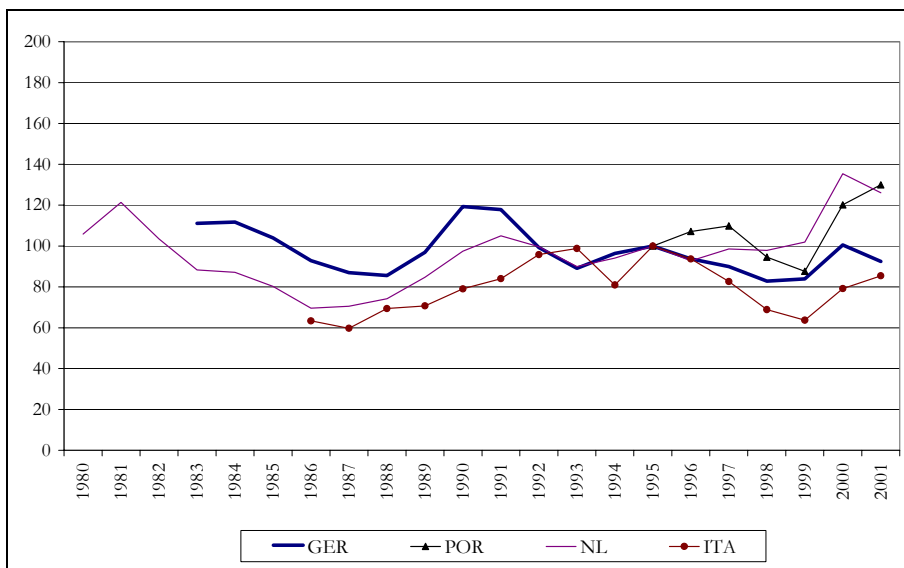


Figure 4. Debt servicing to disposable income (1995=100)



Source: ECB

Figure 5. Mortgage/GDP in Hungary

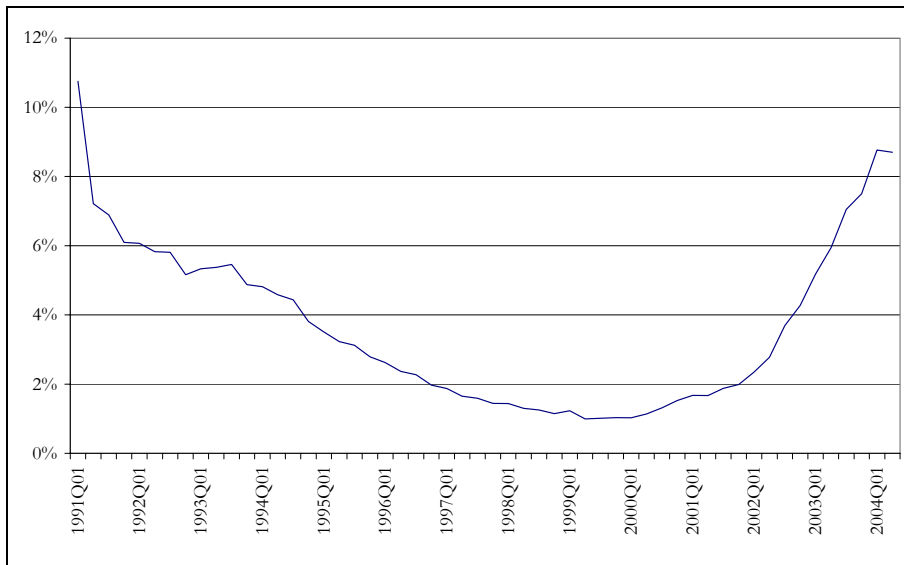


Figure 6. Housing transaction/housing stock in Hungary

