A model of the Spanish housing market

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Abstract: The Spanish housing boom of the early 2000s has raised enormous attention at international level. To better understand what is happening in the housing market the current Spanish boom needs to be put in context. Housing demand, the motor of the boom, has been triggered by population growth, employment generation, increase of per capita income and favourable financial conditions. Supply has reacted in a very flexible manner and 2006 has witnessed historic levels in residential construction. Yet, this boom seems to be coming finally to an end in 2007, mainly driven by mortgage rate increases. The aim of this article is threefold: (1) to identify the determinants of the rise of house prices in the last decade; (2) to discuss the likely future of the housing market; and (3) to build an econometric model of the Spanish housing market.

Key words: Spanish housing market, housing econometric model, housing bubble, Spain.

1. Introduction

The housing boom in the Spanish housing market has continued through early 2007. Yet, there are signs of a progressive adjustment of the market. All the information available suggests that there will be a soft landing of the Spanish housing market towards sustainable levels of demand and supply in the future. After expecting a readjustment of the housing market for a number of years now, unsurprisingly, it is said that 2007 will mark the end of the great Spanish housing market boom, but guessing the time and scale of a shift in the housing

market cycle is proving as a game of chance. Predicting real estate downturns and their effects is always difficult (Ball 2007) as the Spanish case is clearly demonstrating.

To better understand what is happening in the housing market the current Spanish boom needs to be put in context. Spain has neither had the greatest real house price rises in Europe nor is it the most indebted. Housing demand, the motor of the boom, has been triggered by population growth, employment generation, increase of per capita income and favourable financial conditions. Moreover, the scale of foreign involvement in the housing market far exceeds any other experience in Europe. The Spanish housing boom, then, has been the consequence of the interaction of a number of economic, social and demographic factors which need to be analysed.

The aim of this article is threefold: (1) to analyse the workings of the housing market in Spain and identify the determinants of the rise of house prices in the last decade; (2) to discuss the likely future of the housing market; and (3) to build an econometric model of the Spanish housing market.

2. The Demand for Housing

The demand for housing depends on demographic, social and economic factors. The specialised literature identifies two concepts of housing demand: potential demand and effective demand. Potential demand is affected by demographic and social factors, especially those related to migratory movements and household creation trends. Effective demand is the materialisation in the market of potential demand and depends on economic factors such as households' income, household's wealth and the cost of use of housing. Therefore, potential demand guides the market in the long run while effective demand is responsible for the evolution in the short and medium term (García Montalvo and Mas 2000).

In the Spanish housing market it is important to distinguish also between demand for usual or primary homes and vacation homes, that is, housing used for seasonal, recreational or occasional use. While demand for primary housing is mainly affected by demographic, social and economic factors, demand for vacation homes is affected mostly by economic factors, though demographic factors must be also taken into account. Demand for vacation homes in Spain has come not only from national residents but also from foreign demand, mainly from the EU.

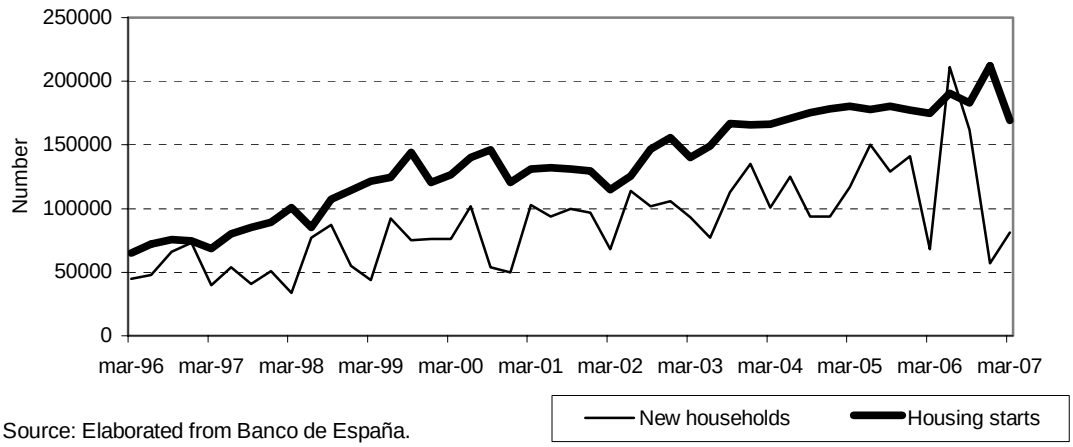
It is also important to make a distinction between demand for housing associated to the shelter services it provides and demand for housing as an asset, which derives from the expectations on capital gains as compared to other investment options.

Among demographic factors operating in the Spanish housing market two must be highlighted. On the one hand, the intense process of immigration since the mid-1990s which amounts to around 3 million people, taken into account only those with a legal status. On the other, housing demand is not only affected by changes in total population but also by its age structure because this variable is closely related to the rate of household formation. In Spain, housing demand for primary homes is highest for the group of 20-34 years, while demand for vacation homes is highest for the group of 35-49 years (García Montalvo and Mas 2000). Precisely, these groups of population have been increasing at a fast rate between 1991 and 2005 due to the Spanish baby boom of the 60s and 70s. While total population has grown 11.8% in this period (39.4 to 44.1 million people), the 20-34 age group has increased 16.5% (9.2 to 10.7 million people) and the 35-49 age group 43.2% (7.1 to 10.1 million people)[(1)].

This demographic evolution has been accompanied by significant social changes in Spanish society such as the integration of women in the labour market, the increase of divorces, separations, monoparental families and other forms of households. These demographic and

social trends have resulted in an important and steady increase in the number of households (32.2% between 1996 and 2006; 12.2 to 16.1 million households [(2)]), which has fuelled Spanish housing demand in the last decade. The favourable evolution of the labour market [(3)] has eased as well the formation of new households and departure from the family home by young people. This evolution has spread across all Spanish regions, being specially marked in the Mediterranean Coast, Balearic Islands and Madrid and its hinterland. Undoubtedly, demographic factors are connected to the booming of housing demand in Spain. As can be seen in Figure 1, the number of housing starts in the last decade in Spain has followed the pace of household formation.

Figure 1 New households and housing starts by quarter



Source: Elaborated from Banco de España.

Amongst economic factors, the most important ones are undoubtedly the real disposable income of households, the cost of use of housing and the net real estate of households. In Spain real disposable income is a better proxy of income than real personal income since public subsidies and fiscal aids are clearly taken into account in making decisions about housing. An increase in real disposable income leads to a higher demand for housing that drives prices up. Real disposable income of households is influenced by the level of

occupation and unemployment and the evolution of productivity. Much of the increase in house prices in recent years can be linked to the long-term rise in living standards of the Spanish population. Job creation has been strong and remains so. Between 2001 and 2006 employment has increased by 3.6 million jobs. This extra employment rapidly translates into additional household formation and demand for housing. Even though, a number of households find it hard to get accommodation on their incomes in a country with limited welfare provision and a scarce rental market (only 11% of the total), many other now consists of more than one income earner. This makes purchase of the primary or second residence more feasible.

Nonetheless, the rise in house prices, a prime exponent of the Spanish housing boom, needs to be put in context since Spain has not had the greatest house price rises in Europe during the current upswing. Other European countries such as France, Ireland, the Netherlands or the UK present similar trends (Table 1).

Table 1 Evolution of House Prices in the EU15. Annual % Change

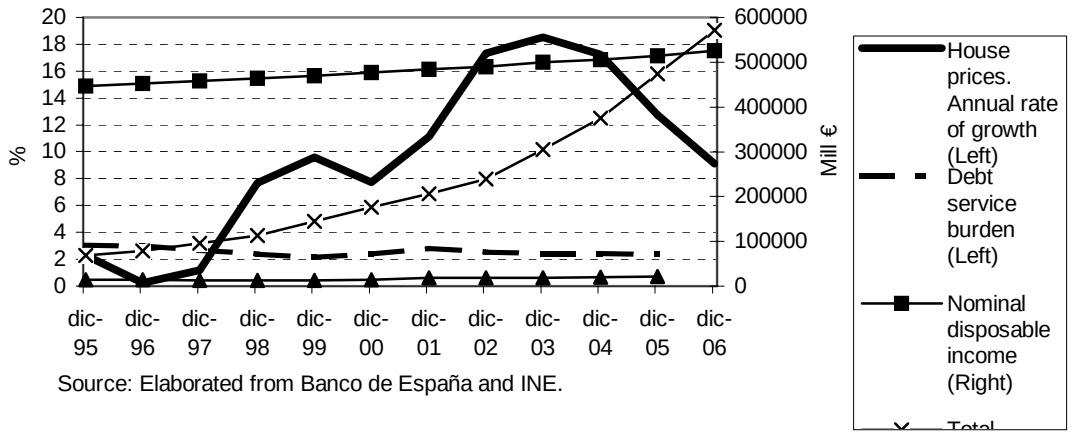
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Belgium	5,9	4,9	6,8	8,7	7,1	6,4	8,2	6,6	10,3	16,3
Denmark	11	11	10,6	8,3	7,2	7,9	5,3	5,2	11,7	17
Germany	-1,6	-0,8	0	0	0,8	0	-1,6	-0,8	-0,8	-1,7
Greece	10,4	9,6	14,4	8,8	10,5	14,6	13	5,7	5,2	10,3
SPAIN	1,3	2,2	6,8	12,3	14,9	11,8	18,1	17,6	17,5	12,8
France	1	2	2,9	7,5	7,9	8,1	9	11,5	17,6	14,7
Ireland	13,3	17,6	28,8	20,4	15,3	8	3,6	14,1	11,2	10,6
Italy	-4,2	-3,8	2	6,7	8,6	7,9	10	10,7		
Luxembourg	3,7	4	5,2	6,5	6,5	10,3	9,9	12,5	13,7	
Netherlands	11,7	12,3	11,7	16,2	16,5	11,2	8,5	5	4,3	4,8
Austria						3,5	-0,2	0,4	-2,8	4,9
Portugal	2,2	4,4	5,8	8,6	8,8	2,2	0	1,5	0,3	2,8
Finland	5,4	17,6	10,2	8,8	5,9	-0,9	7,4	6,4	7,1	6,1
Sweden	0,5	7	9,6	9,2	11	8	6,3	6,6	9,6	9,6
UK	3,5	9,3	11	11,5	14,3	8,4	18	14,7	11,8	5,6

Source: Hypostat 2005

Housing, as any other form of capital, has a cost of use which affects negatively its demand. Its most important components are the mortgage rate and other financial conditions. Mortgage rate has sharply decreased in Spain since the mid 1990s. Mortgage costs in real terms fell because of declining nominal rates and because of rising inflation [(4)]. The relatively high rate of inflation has meant that real interest rates on loans are extremely low and have been negative in a number of years, helping stimulate mortgage demand and house price inflation. This has led to an increase in housing demand and house prices. The lowering of housing inflation since 2005 is linked to the upturn of the mortgage rate.

But households' borrowing behaviour is not only affected by the mortgage rate, other financial aspects are also important. The debt service burden measures the ratio of interest payments on consumer debt to nominal disposable income and it is an indicator of the effort made by households to buy their housing. The higher the mortgage rate is, the bigger the debt service burden. And inversely, the higher the nominal disposable income is, the lower the debt service burden. If prices are expected to rise households are willing to accumulate more debt and endure a heavier debt service burden. Thus, as we can see in Figure 2, house prices have increased along with increases in mortgage debt. This is a pro cyclical behaviour as it tends to fuel the boom and deepen the bust of the housing cycles.

Figure 2 Evolution of house price inflation, nominal disposable income, debt service burden, total mortgage debt and interest payments on consumer debt



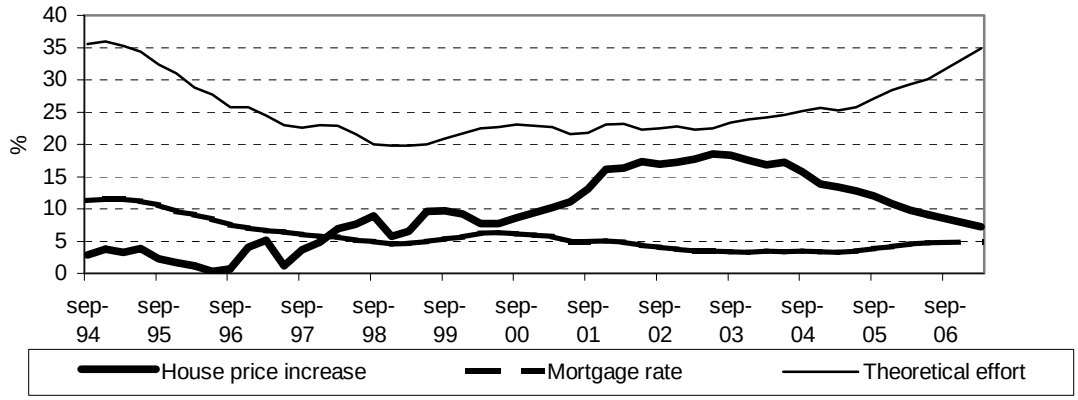
Source: Elaborated from Banco de España and INE.

Nevertheless, a better proxy of households' effort to buy their housing should take into account other financial factors such as for instance the length of the mortgage, the price of housing or the amount of the mortgage in relation to the price of housing. The liberalisation of the mortgage market has played a significant role in the expansion of housing over the last decade. As competition between lenders is strong (Banco de España 2006a), by mid 1990s mortgage lenders began to offer more favourable terms in the form of extended loan terms of 25 to 30 years (and even 40-50 for first buyers) and increased loans to house value ratios. They also started to extend mortgages to up to 100% of dwelling value. The Bank of Spain calculates a theoretical effort indicator which measures the total amount a median household must pay, net of fiscal deductions, during the first year after the acquisition of an standard housing financed through an standard mortgage amounting to 80% of housing total price, as a percentage of nominal disposable income of the household (Martínez Pagés 2005). The relationship between the evolution of house prices, the mortgage rate and this theoretical effort can be seen in Figure 3.

This partly explains why Spanish housing demand has risen at a time of high housing inflation, thus fuelling the boom in the market. By 1995 households had to pay a 35% of their nominal disposable income. The favourable evolution of the mortgage rate and other financial conditions (e.g., length of the mortgage, total price/mortgage amount ratio) led to a gradual decrease in the effort made till a minimum of 19.8% in the mid 1999. The decrease of the mortgage rate between March 2004 and September 2005 was more than offset by the increase in house prices, thus pushing up the theoretical effort which nevertheless remained below 25%. The rise of the mortgage rate since the end of 2005 has significantly augmented households' effort by ten percentage points till 36% in June 2007 and brought house price inflation down.

In the period Dec 2005 - Dec 2006 mortgage interest rates rose on average by 1.28%, more than 40% over the very low levels of early 2005. Yet mortgage lending rose by more than 25% between 2005 and 2006, so that the increase in interest rates only had a limited effect in restricting demand.

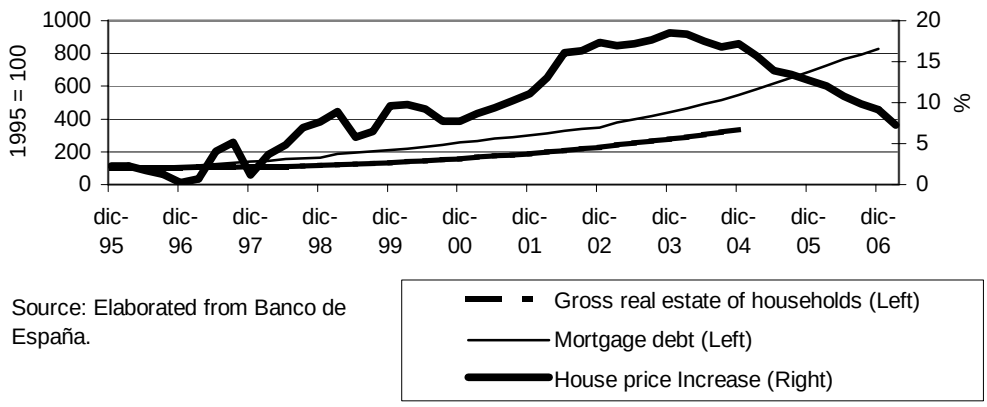
Figure 3 Evolution of house price inflation, mortgage rate and theoretical effort



Source: Elaborated from Banco de España.

Housing can also be demanded as an asset, as a form of wealth. Undoubtedly, an important driver of Spanish housing demand has been the expectations of substantial capital gains in an environment of cheap and easy borrowing. In this case the behaviour of households is determined by the expected evolution of house prices and the financial conditions of the market. Fiscal benefits are of minor importance in this respect since fiscal benefits apply only to primary homes. The net real estate of households measures the value of property less the mortgage obligations. As house prices increase, the resulting capital gains lead housing demand up and households are willing to borrow from the market. Thus, there is a positive correlation between house prices and mortgage debt in the short run. However, a time arrives when the pace of debt accumulation exceeds the increase in house prices and the rate of increase of net real estate of households begins to fall. At that moment demand for housing as an asset begins to fall as a consequence of the wealth effect of the net real estate of households in housing demand. Figure 4 shows that as house prices have been escalating, thus pulling the gross real estate of households up, these have been willing to increase their debt. One can expect that the landing of house prices since 2005 will progressively bring down the revaluation of households' real estate and hence the investment component of housing demand.

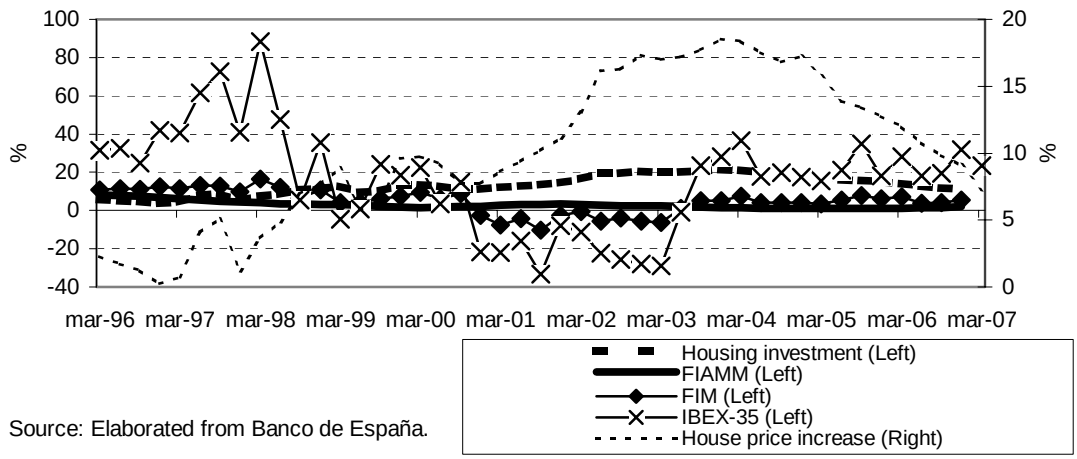
Figure 4 Evolution of gross real estate of households, mortgage debt and house prices



Source: Elaborated from Banco de España.

An alternative way of examining the evolution of housing profitability is to compare this variable with the profitability of alternative assets such as Investment Funds (FIM or FIAMM[5]) or the Stock Exchange Index (IBEX35) (Figure 5). Households make their decisions about investing in housing taken into account the alternative investments available to them. The burst of the equity bubble in the early 2000s channelled investors into the housing market looking for the expected capital gains and thus further pushing house prices up. The financial market recovery since 2003 has attracted again investors helping a gradual landing of house prices. Much equity withdrawal has been ploughed back into the housing market via contributions to children's house purchase and the buying of second homes.

Figure 5 Annual profitability of housing investment and alternative investments (investment Funds - FIM and FIAMM - and the IBEX-35). Annual house price increase



Source: Elaborated from Banco de España.

This has to do also with cultural factors. Spanish housing conditions are some of the most crowded in the EU and dwellings tend to be also among the smallest. As a compensating element, Spanish households have a high propensity to own a second home in the countryside or on the coast: over a fifth already own one. Much of housing demand has come, in fact, from the secondary home market.

Even if last data come from the 2001 Census, it is likely that around a third of the stock of existing dwellings is not in the primary home sector, almost certainly the highest share in the EU. The secondary home market satisfies thus a housing need of Spanish households, which may be considered as structural to the market, and at the same time is a way to accumulate wealth for the future instead of entering into the financial markets (Stock Exchange Market, Pension Funds, etc.).

In general, the wealth holdings of Spanish households are highly concentrated in real estate (mainly housing). In the early 2000s [(6)] 87% of households' wealth was held in property and these figures may have increased after the subsequent housing boom. There is an interesting breakdown of real estate wealth with a 59% of it derived from primary homes and 21% in other real estate (second homes and vacant holdings as well as privately rented and non-housing sectors). As can be seen in Table 2 the propensity to own a second home applies to households of different rent and wealth levels even though as rent / wealth increases the more likely is to own a second residence. Therefore, the rising of living standards in Spain is resulting in an extension of the stock of second homes.

Table 2 Real estate wealth of households by type of asset

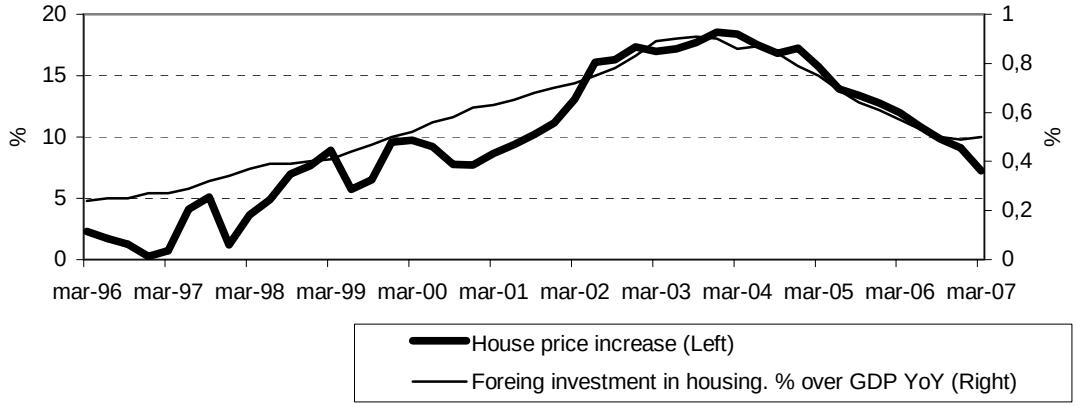
	Primary home	Other real estate asset
% of households who own the asset		
All households	81,9	30,1
Rent percentile		
Less than 20	74,1	18,0
Between 20 y 40	79,2	23,6
Between 40 y 60	80,5	26,3
Between 60 y 80	85,3	33,1
Between 80 y 90	88,6	42,8
Between 90 y 100	92,1	56,3
Net real estate wealth percentile		
Less than 25	38,6	7,1
Between 25 y 50	94,7	18,4
Between 50 y 75	97,3	31,8
Between 75 y 90	97,4	53,7
Between 90 y 100	96,3	77,0

Source: Elaborated from Encuesta Financiera de las Familias, 2002. Banco de España.

Moreover, the secondary home market operates, in part, independently from the primary one, and is influenced not only by domestic factors but also by the economic conditions in countries such as Germany, the Netherlands and the UK because many buyers are foreigners.

Housing investment by foreigners, especially in the coast, increased since the mid 1990s picking in 2004 when it represented 0.91% of GDP. Since then it has gradually decreased amounting to 0.49% of GDP in December 2006. Yet, the economic recovery of their home countries has led to a new upturn of this variable (Figure 6). The presence of foreign purchasers in the second-hand market is very difficult to identify but it has been also significant (Ball 2007).

Figure 6 Foreign investment in housing



Source: Elaborated from Banco de España.

3. The Supply of Housing

Most of the people live in old dwellings, often in structures built many decades ago. The current life expectancy of a dwelling is close to a hundred years. This fact highlights one of the most important facets of housing: New units represent a small component of the stock. The supply of housing, then, is composed of new and existing dwellings. The supply of new housing is closely related to the supply of existing houses.

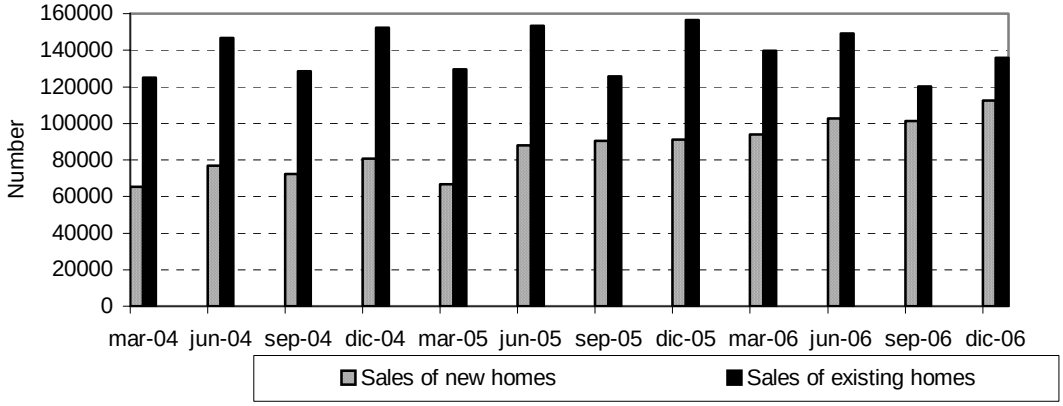
Both property developers and existing homeowners are willing to increase the supply of housing, other things being equal, if house prices are rising. As housing demand begins to increase due for example to demographic or wealth factors house prices begin to rise along with residential investment. This sends a signal to property developers and existing home owners to increase the supply of new homes. However, this higher supply in the long run, other things being equal, leads to lower house prices. This is not an instantaneous process [(7)] since there is a lag between the price signals in the market and the reaction of existing home owners and property developers especially because of three main reasons.

First, many activities are needed before a new dwelling is in the market - recognition of the potential for development, assembly of the site, building project, planning permission, financing of the development, building process, arrangement of first letting or sale of the development. It has been argued that the features of the property development and planning process in Spain make this issue particularly troublesome. This fact, in periods of rapid demand changes, may fuel house prices up even if home buyers may be willing to acquire houses which have not yet been started or are under construction, especially in the most expansive phases of the cycle. Second, property developers make their decisions based on expectations about future evolution of house prices and housing demand but they are not willing to face future excesses of supply. And third, the expectations of existing homeowners about future capital gains.

Unfortunately, statistical information about the second hand market is not available until 2004, but this segment of the market has been very active throughout the housing boom though last year's figures show a slight decline in activity (Figure 7). Facing an overwhelming demand for housing, new output has been growing every year and there are no clear signs of deceleration, even though unsubsidised housing transactions have not increased in the last quarter of 2006, for the first time in many years (Figure 8). New housing supply represents nowadays almost 50% of total housing supply, thus contradicting many real estate theoretical analyses [(8)] which consider that new supplies tend to be insignificant in comparison with the supply coming form existing stocks.

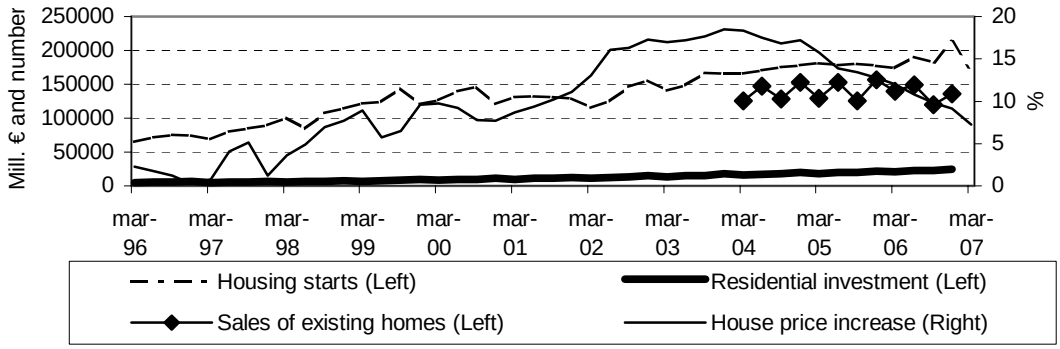
Furthermore, much of the new output has been destined for the second home and investment market and shortages have been highest in the places of highest need, the major cities. Around 54% of housing output in 2005 took place in the tourist coastal areas, whereas only 8% occurred in the big cities.

Figure 7 Sales of new and existing homes by quarter



Source: Elaborated from Ministerio de

Figure 8 Evolution of house prices, housing starts, existing home sales and residential investment



Source: Elaborated from Banco de España and Ministerio de Vivienda.

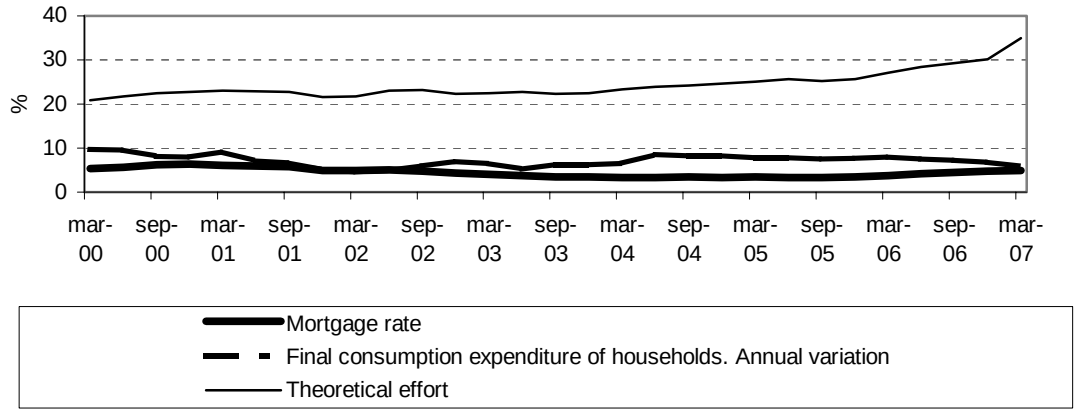
4. Prospects for the Future of the Spanish Housing Market

The future of the Spanish housing market is very difficult to forecast. Despite so many warnings, there is little evidence of a major downturn in the near future. On the contrary, a gradual correction in the future is very likely; in fact, there are signs that such a correction has yet started. The scale of such correction depends very much on the behaviour of major actors

which are already in the market. What will they do if there is a significant slowdown in the market?

A likely guess is that owners of primary homes, even if the burdens of mortgage debt go up, will continue to pay their mortgages and retain their shelter facilities and cut down on other expenses. In fact, the growth of both final consumption of households and lending to households for consumption has shown signs of a slowdown since mid 2006 (Figure 9). A necessary qualification here refers to a severe worsening of economic, employment and financial conditions which are not foreseen at the moment by any national or international economic institution.

Figure 9 Final consumption of households, mortgage rate and theoretical effort



Source: Elaborated from Banco de España and INE.

Owners of vacation homes, nationals and foreigners, and owners of investment dwellings may wish to dispose of an asset which may become recognised as a "wasting asset". But why sell in a stagnating or declining market when you are not forced to and, at the same time, incur in high transactions costs when the possibility of another upturn in the future exists, in particular when housing is seen as a long-term and a secure investment. As Ball (2007, p. 98) puts it "sitting it out in the sun does not seem much of a burden for many". Moreover, as has been

argued above, the secondary home sector seems to satisfy housing needs of Spanish population which appear to present different features to those of other countries in the EU. Besides, housing (primary and secondary residences) is seen by Spanish population as a long-term investment and a source of wealth for the future.

As has been discussed above, affordability issues have begun to arise. The effort households must make to pay for their mortgage has been increasing. Progressively, more households are becoming vulnerable to even relatively low increases in interest rates. This is discouraging some new entrants as well as existing owners contemplating buying a better home, leading to the adjustment of housing demand. However, current forecasts on interest rates and the decline in house price rise suggest that affordability levels will not deteriorate much further in future years. Employment generation and growth of disposable income appear as the countervailing force against higher financial burdens in an environment of higher interest rates.

It should also be noted that housing demand for primary homes has been strong in the market and is expected to still put pressure on local housing markets. Acute housing shortages still continue, despite all the building, especially in major cities which have had some of the lowest rates of new building. Demographic forecasts suggest a significant rate of new household formation because of the age profile of the population and the reduction in household size, which is gradually converging with that of many EU countries. The greater affluence of younger people means that they are increasingly reluctant to stay at home with their parents until so late in life. There is also a move towards the bigger, more economically successful areas in the country, which is increasing the vacancy rates in old industrial and rural areas while important shortages remain elsewhere. Furthermore, the rate of immigration into Spain is currently the highest in Europe and despite their current low incomes they have started to enter slowly into the owner occupied housing sector, especially into subsidised housing.

Housing demand still shows a significant strength, based upon fundamental factors: household formation trends, employment generation, increase of per capita incomes, and still moderate increases of interest rates.

It should also be taken into account that housing shortages and housing affordability has become central in the Spanish political agenda. All institutions – central, regional and local – are becoming increasingly involved in housing provision in an attempt to improve affordability and accessibility for low and medium income groups, especially new entrants. It is very likely then to witness in the near future an expansion of housing policy schemes.

The property development sector

Therefore, the future of the Spanish housing market is more likely to be in the hands of property developers and their ability to foresee the market and adjust output quickly enough, than the threat of a major exodus from those who have already purchased or a collapse of housing demand.

The gradual slowdown in the rate of change of house prices, along with the progressive rise in interest rates, is in line with the recent trend in house purchase lending (a decline in the number of mortgage transactions linked to residential property purchases and the rate of growth of mortgage credit). This contrasts with the developments in credit to real estate sector. This decoupling, if it persists over time and is accompanied by a marked slowdown in economic growth, which is not foreseen at the moment, would constitute a risk factor for the Spanish financial system since, historically, construction and property development loans have shown the highest default rate of all corporate credit.

However, it must be noted that the observed acceleration of housing starts and lending for construction and property development in the second half of 2006 may reflect the new projects undertaken early by property developers in 2006 ahead of the entry into force of the new construction quality regulations with the attendant higher costs (Banco de España 2007; BBVA 2007). It is expected then that the pace of housing completions will decelerate by the end of 2007 and 2008. It should also be noted that in both markets for new and second hand homes the period necessary to sell a house seems to be increasing and, especially, in the market for existing homes there are more difficulties for the upper level houses (bigger, better quality, better located).

Moreover, a brief analysis of the process of house price formation may also shed light into future adjustment ability of the property development sector to foreseeable house price corrections. Houses will be sold at the maximum price demand is willing to pay for. House prices are made of two major components: building costs (including land development, construction, and transaction costs and normal profit) and land prices. Competition among developers ensures that any super-normal development profit tends to accrue to sellers / owners of building sites in the form of higher land prices. Spanish house price inflation has not been the result of higher construction or financial costs but the consequence of booming demand which determines the price of land from the point of view of builders as a whole.

Thus, land price becomes a good indicator to anticipate the evolution of house prices. While the rise of land prices in 2004 was over 20%, it has gradually reduced to 8.0% in 2005 and 6.3% in 2006 [(9)].

The ability of property developers to rapidly adjust to house price decline will depend very much on their past strategy of land acquisition and their financial soundness. If they have bought land well in advance house price decline will just shrink super-normal profits. If they

have bought land late in the booming period they might then face serious troubles. Unfortunately, there is not sound information on land acquisition strategies by property developers in Spain, but available data suggest that the housing boom has been accompanied by a long-term process of concentration in the land market: a small number of property development companies hold a large amount of available land for development in the most dynamic areas.

The property development sector in Spain has undergone important transformations in the last decade. It has endured a process of concentration, specialization, diversification, and internationalization. The Spanish housing market is increasingly controlled by big companies, very competitive in international markets, which perform simultaneously in the different branches of the property development and construction sector. If there is a significant slowdown in housing activity many small firms may disappear but it is likely that the big companies, the core of the sector, will be able to readapt to the new circumstances entering into the remaining housing segments and other type of construction activities nationally and abroad.

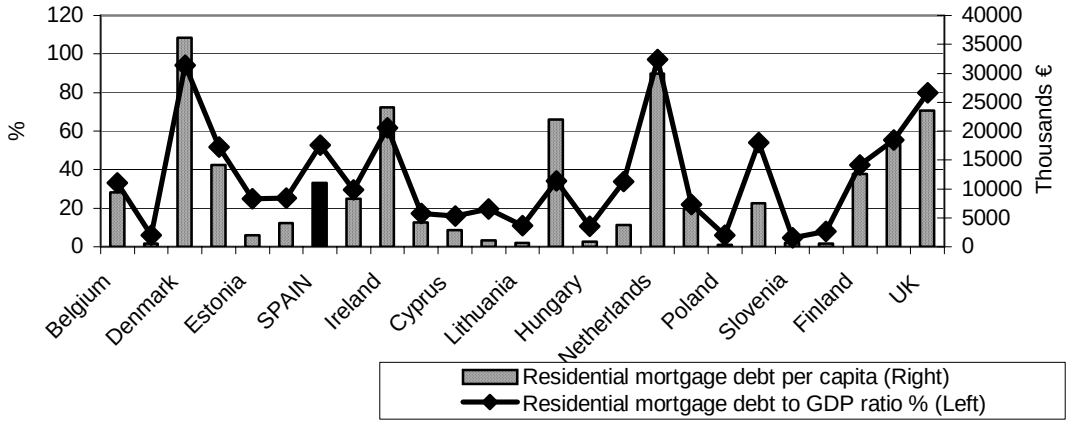
In addition, it must be taken into account that housing adjustment is not taken place at a moment of general economic adjustment. On the contrary, general macroeconomic perspectives, both internal and external, seem to be favourable for the Spanish economy (BBVA, 2007).

The behaviour of lending institutions

A further question here is whether there might be risks arising from the increasing indebtedness of Spanish households. The increase in interest rates and in household debt led to a further rise in the indicators of financial pressure on households. Yet, as we can see in Figure 10, Spain is not the most indebted country in the EU in terms both of Residential

Mortgage Debt to GDP ratio or per capita Residential Mortgage Debt. Therefore, the worry does not come from the level of indebtedness but from the acceleration in the "catching-up" of Spanish housing market with those of the most advanced countries in the EU.

Figure 10 Residential mortgage debt to GDP ratio, 2005



Source: Elaborated from Hypostat 2005.

Despite the higher debt burden of Spanish households, on average its level does not seem to represent a significant level of financial pressure that could lead to an appreciable increase in doubtful assets. However, it should be remembered that these estimates are based on aggregate information and could mask less favourable situations for certain groups, especially low income groups who use a significant percentage of their income (over 40%) to meet the obligations arising from this debt (Banco de España 2004).

As noted above, easier terms on mortgage lending, a high average mortgage to income ratio, the current level of house prices, and the rise in mortgage interest rates all indicate that the sheer magnitude of the recent boom has now exposed mortgage lenders to greater risk than was the case earlier in the housing market cycle, although current defaults are still extremely low. Residential mortgage exposure risks (Doubtful residential mortgages as % of total

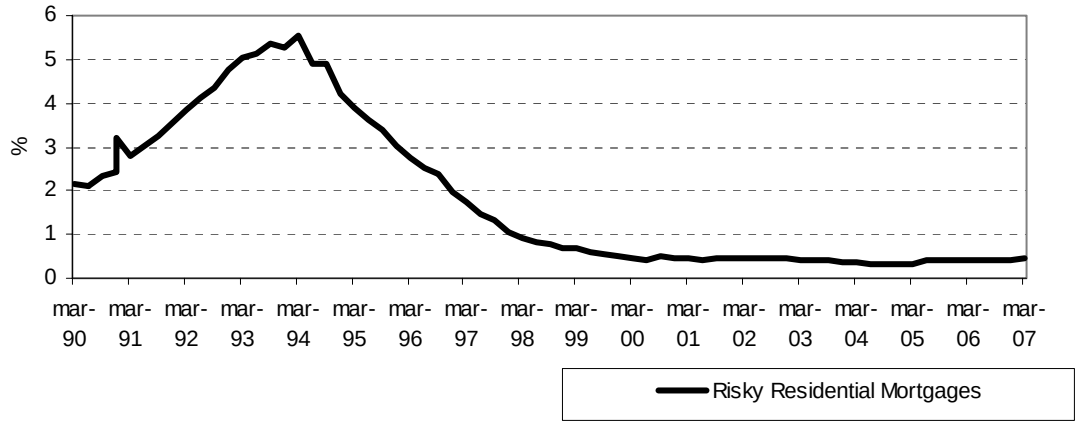
residential mortgages) have slightly increased from the historic minimum of 0.30% in December 2004 to 0.43% at the end of 2006 (Figure 11). Yet, doubtful assets ratios of house purchase lending to households remain at very low levels, in particular when compared with those of other developed banking systems.

At international level, the doubtful asset ratios of Spanish institutions are among the lowest. In particular, the doubtful assets ratios of mortgage lending to households in the Spanish market contrast markedly with those of such lending, for instance, in the US market. In addition, it should be noted that the current proportion of mortgage loans in Spain to individuals who at some time in the past have failed to meet their credit obligations is very small (1.27%). Moreover, although the doubtful assets ratio for mortgage loans is higher among foreign residents, its level of 1.4% is also very low. Finally, the available information on the defaults of the new mortgage loans granted in late 2005 and in 2006 does not show that they are performing any worse than those granted in the previous three years (default rates around 0.04% or 0.07%, measured six months or one year after loan origination, respectively).

It should also be taken into account that bank risk management in Spain has changed significantly in the last decade, which should help to reduce the negative impact of a potential cyclical downturn. Prudential mechanisms have improved and the low volume of doubtful assets is fully covered by provisions (Banco de España 2007, p. 29; 2006b, p. 29-30).

Therefore, default problems seem not to be a major concern; they are more associated with particular individuals and parts of lender portfolios. The current performance of the economy (Favourable evolution of real disposable income and employment conditions) and a decrease in households' consumption levels is somewhat compensating for the increase in interest rates and house prices.

Figure 11 Doubtful residential mortgages (% of total residential mortgages)



Source: Elaborated from Banco de España.

As has already been indicated one option open to lenders and borrowers in the face of interest rate increases has been to lengthen the repayment period of mortgages. This increases annual affordability, as capital paid back each year falls. In fact, this has been the case [(10)]. Yet, as Banco de España calculations indicate there are limitations to the reductions in annual payments that may be achieved through this channel. This, in turn, reduces the possibilities of offsetting the effects on annual payments arising from a possible rise in interest rates through further increases in the terms of the credits. As the mortgage interest rate rose from 2005 levels, the term would have to lengthen considerably, and in a non-linear way, to be able to maintain constant monthly repayment: by 5.5 years to counteract the consequences of 1% rate increase. Another percentage point would require a further extension of 14 years. If rates reached 6.2% it would not be possible to offset the change in payments by lengthening the term, since it would exceed the maximum permissible of 60 years (Banco de España 2006a, p. 43).

Such strategies, of course, may limit the effect rising interest rates may have on cooling housing demand. Moreover, it is important to point out that the lengthening of terms also

increases the time during which borrowers are exposed to possible shocks that have a negative impact on their ability to pay. This certainly poses new and significant challenges for banks in terms of the need to appropriately assess and manage exposures at longer terms in the future as well as to the new perspectives of the housing market. In this respect, Pedro Solbes, Minister of Economy, has recently warned against the lengthening of mortgages and excessive "innovation" in mortgage products: "Mortgage terms should be linked to the live time of people. It should be desirable to go back to mortgage terms of 20 or 25 years"[(11)].

In fact, according to the last information published by the Banco de España (Tiana Álvarez 2007) banks have already begun to adopt a more prudent attitude towards mortgage lending in view of the declining perspectives in the housing market and they plan to continue so in the next months. They have hardened mortgage conditions in different ways: reduction in the mortgage amount / house value ratio; reductions in the amounts draw able by their more risky customers; or higher guarantees to access mortgage credit.

5. A Model for the Spanish Housing Market

Data and equations

Based on the discussion presented in the previous sections, we arrive at the following choice of variables for our econometric investigation:

- Number of households (LHOUSEHOLDS)
- Real Housing prices per square metre (LPH)
- Real Disposable Income (LRYD)
- Real Residential Investment (LRRI)
- Growth (six months-on-six months) of the Real Disposable Income (GRDY)
- Mortgage rate (MR)
- Number of House Starting (LHST)
- Debt Service Burden (DSB)

All variables are included in real terms, having been deflated using the GDP deflator. Moreover, all variables, with an "L" in front are expressed in natural logs. Our data are quarterly and cover the period from 1996:Q3 to 2006:Q4.

According to the theoretical framework the supply side of the Housing Market is proxied by the Real Residential Investment (LRRI). The demand side of the Housing Market is affected by the Real Disposable Income (RYD), the Mortgage Rate (MG) and the Debt Service Burden (DSB). This model could be completed including in the supply side the Number of house starting and in the demand side the Number of households and the real Net estate of households. Nevertheless, the inclusion of these variables generates a multicolinearity problem and so, it has been decided on his exclusion of the model. One of the causes of this problem is the shortness of some of the series.

The equations that are subject to be estimated are as follows:

$$LPH = \underset{(+)}{LRYD} + \underset{(-)}{MR} + \underset{(-)}{LRRI} + \underset{(+)}{DSB} \qquad (1)$$

$$LRRI = \underset{(+)}{GRYD} + \underset{(+)}{LPH} + \qquad (2)$$

$$LHST = \underset{(+)}{LPH} + \underset{(+)}{LHOUSEHOLDS} \qquad (3)$$

According to the explanations of the theoretical framework, below each equation the expected signs of the long-run coefficients are presented. The set of equations are based on a previous work by Arestis and Karakitsos (2007) for the US housing market.

Econometric methodology

Our econometric approach involves estimating the long-run equilibrium relationship of the equations presented above as well as the short-run adjustment dynamics. Special attention is paid to the housing prices equation.

The methodology we use to determine the above relationships consist of a cointegration test which is carried out in three steps. The first step consists of implementing a unit root test. The second step is a cointegration test. Finally, the third step involves the construction of an error correction model which represents the short run dynamic of the variables. The econometric software used to run this model is Eviews 6.

As the existence of cointegration among a set of variables requires that all of them being integrated of the same order, the first step in the empirical investigation consists of determining the order of integration of the individual temporary series. In particular, the unit root test of Augmented Dickey-Fuller (DFA) is implemented. The results suggest that variables are integrated of order one I(1) (the results are available from the authors upon request).

Once we have tested that all series are integrated of the same order, the second step of the analysis consists of determining the existence of cointegration. The methodology used to deal with this analysis is the procedure in two steps proposed by Engle and Granger (1987). As we have mentioned above, this method first involves the estimation of a long-run relation among variables. The relationship among non-stationary variables can be tested by means of an OLS regression (named as Cointegrating Relationship) on the level of the variables. Next, the hypothesis of cointegration is verified by using the Augmented Dickey Fuller test on the residuals of the cointegrating equation. If residuals are stationary, then, it exist cointegration, and the estimated equation can be seen as a long-run relationship.

The results of the OLS regression on the levels for each equation are presented below. We report the t-statistics of each estimated coefficients. We also report the R square, the F statistic (with its p-value), the Akaike Information Criteria and the Schwartz Information Criterion. The results of the ADF on the residuals of the equations allow us to conclude that there exists a long run relationship among the series (the results are available from the authors upon request).

$$LPH = \underset{(2.10)}{1.0436} + \underset{(7.68)}{0.8510}*LRYD - \underset{(-5.78)}{0.0303}*MR(-2) + \underset{(1.99)}{0.0786}*DSB + \underset{(2.83)}{0.0565}*LRRI(-1) \quad (1a)$$

R-squared = 0.87, DW = 0.61, AIC = -3.31, SIC = -3.31, F-statistic = 65.30 ($\rho = 0$)

$$LRRI = \underset{(-1.88)}{-4.7241} + \underset{(4.89)}{2.2224}*LPH + \underset{(3.31)}{1.0804}*GRYD(-4) \quad (2a)$$

R-squared = 0.52, DW = 0.72, AIC = 0.54, SIC = 0.67, F-statistic = 19.05 ($\rho = 0$)

$$LHST = \underset{(-7.37)}{-7.0276} + \underset{(9.25)}{2.6418}*LHOUSEHOLDS + \underset{(2.37)}{0.2224}*LPH(-4) \quad (3a)$$

R-squared = 0.84, DW = 0.74, AIC = -3.180.54, SIC = -3.05, F-statistic = 96.65 ($\rho = 0$)

The long-run coefficients are all statistically significant for the three equations and carry or the expected signs.

More specifically, housing prices are positively and significant related to Real Disposable Income, Debt Service Burden and Real Residential Investment with a coefficient of 0.8510, 0.0786 and 0.0565 respectively. In turn, housing prices are negatively and significant related to Mortgage Rate with a coefficient of -0.0303 respectively.

The Real Residential Investment is positively and significant related to the Growth of the Real Disposable Income and the Housing prices with a coefficient of 2.2224 and 1.0804, respectively.

Finally, the House Starting is positively and significant related to the Number of Households and the Housing Prices with a coefficient of 2.6418 and 0.2224 respectively.

According to the Engel and Granger (1987) theorem, the cointegrated series have an error correction mechanism or short-run relationship and, inversely, error correction mechanisms generate cointegrated series. The long-run equilibrium relation can then be used to estimate error-correction model (ECM) for the different endogenous variables. The estimation of the error correction models is the second step of the Engel and Granger procedure and consists of replacing the residuals of the cointegrating regression in the ECM in the position of the term in levels. This is implemented by regressing in differences the variables of the long run equation, including the residual with a lag and being suitable incorporating lags to the differences of the series. The results of the ECM are presented in Appendix 1.

From the long-run equilibrium equations the following conclusions may be derived.

- The evolution of house prices is mainly explained by demand factors, Mortgage Rate, and especially Real Disposable Income.
- Supply factors behave with the expected sign and they are significant.
- The House starting seems to be driven mainly by the number of households as well as by the housing prices. The latter variable could provide an argument in favour of the existence of a housing bubble in Spain. However, an in-depth analysis of the structural elements of the Spanish housing market leads us to believe a smooth adjustment of the housing in the medium term, as has been argued in the previous section

6 Conclusions

The Spanish housing boom seems not to be an artificial bubble created by low interest rates and speculation, but the result of increasing wealth of Spanish and European population, changing demographics and new mortgage products that have helped the purchasing of homes

both in the primary and second residence markets. The rise in housing prices would not be, then, the result of excessive speculation, as it occurs in a bubble. This does not mean that a certain readjustment of house prices is not necessary but a soft landing to the housing market boom is the more likely prospect in the absence of any severe economic or financial shocks.

The warnings in the market are leading to tighter mortgage conditions on the part of Mortgage lenders. Thus, higher housing costs as well as expectations on lower capital gains will lead gradually to the end of housing demand boom while there might still be a significant degree of activity in the sector, even though at a lower level than recent historically high levels.

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(1) Population data from INE.
(2) EPA (Encuesta de Población Activa).
(3) The number of employed people has increased in Spain from 12.4 million in 1995 to 20.0 million in 2007, while unemployment rate has decreased from 18.4% in 1995 to 8.4% in 2006.
(4) A standard mortgage for house purchase in the Spanish market has a floating interest rate and constant payments. This feature has enabled the declines/increases in the monetary authority's key interest rates to be passed through rapidly to the cost not only of new mortgages, but also of most existing mortgages.
(5) **FIAMM** (Investment Funds in Assets of the Monetary Market): They are also known as "Money Funds". Their capital is invested mainly in short-term assets with a fixed profitability such us Treasury Bills. These Funds are suitable for investors with high risk aversion.
FIM (Fondos de Inversión Mobiliaria): (Stock Exchange Investment Funds): They can invest in all kinds of assets without limitations but generally they tend to invest in long-term assets. Investors are willing to take a higher risk.
(6) Encuesta Financiera de las Familias (EFF), 2002. Banco de España.
(7) Housing supply in the short and medium term is fairly inelastic.
(8) See, for example, (Harvey, 1985).
(9) Statistics on Land Prices, Ministerio de Vivienda.
(10) At the beginning of the 1990s, loans to households for the purchase of property had an average interest rate of around 15% and a standard term of about 15 years. According to information supplied by the Association of Registrars, the average interest rate on new household mortgages in 2005 was 3.2% and their term was 25.5 years (Banco de España, 2006a, p.43).
(11) El Mundo, 20th June 2007.

Appendix 1

The Error Correction Models are:

$$\Delta_1(LPH) = 0.0023 + 0.7174^* \Delta_1(LRYD) + 0.2893^* \Delta_1(LRYD)_{t-1} - 0.2345^*ELPH_{t-1} \quad (1b)$$
$$(0.54) \quad (8.37) \quad (3.52) \quad (-2.22)$$

R-squared = 0.65, DW = 2.62, AIC = -4.34, SIC = -4.17, F-statistic = 23.73 ($\rho = 0$)

$$\Delta_4(LRRI) = -0.0325 + 0.5048^* \Delta_4 (LRRI)_{t-1} - 0.7552^*ERRI_{t-4} \quad (2b)$$
$$(-0.64) \quad (4.71) \quad (-4.56)$$

R-squared = 0.61, DW = 1.62, AIC = 0.46, SIC = 0.59, F-statistic = 23.89 ($\rho = 0$)

$$\Delta_8(LHST) = 0.0599 + 0.1144^* \Delta_8 (LPH) + 0.2587^* \Delta_8 (LHST)_{t-1} - 1.1228^*ELHST_{t-8} \quad (3b)$$
$$(5.52) \quad (2.31) \quad (2.65) \quad (-6.91)$$

R-squared = 0.83, DW = 1.95, AIC = - 3.89, SIC = - 3.71, F-statistic = 46.76 ($\rho = 0$)

The letter Δ indicates the change in the variable. As our data are quarterly, the subscript indicates the change in the variable between the corresponding quarter and the initial one.