Is the American housing market posing a threat?

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After acting for several years as a major prop to the vigour of the country's economy, the housing market in the United States seems to have levelled off in recent months. Although the main specialised bodies are still counting on a soft landing for the American housing market some time in the next two years, the implications of this levelling-off for the evolution in housing investment and for household consumption are by no means negligible. Several simulations have been carried out in order to estimate the potential impact of the housing slowdown on these two components of United States growth.
In order to evaluate the impact on housing investment, two complementary approaches were explored. The first, of an accounting nature, aims to evaluate the automatic effect of the expected moderation in housing starts and housing sales. The second is more in the nature of a behavioural equation, inasmuch as it incorporates the traditional determinants of investment decisions, i.e. the respective evolutions in real incomes, in wealth — itself affected by movements in house prices — and in interest rates. On the assumption – widely accepted by the markets — that the rate of the rise in house prices in 2006 will be one third of that seen in 2005, that in 2007 it will be halved again and that mortgage interest rates rise by almost 100 basis points in the next two years, these two methods give results of a similar order of magnitude: roughly 8 points less housing investment in the years 2006 and 2007 (equivalent to around one half-point of GDP).
The implications for household consumption were also analysed, this time using two behavioural equations. The first introduces traditional determinants, i.e. current income, wealth (both housing and financial) and the unemployment rate. The second, taking up more recent approaches, incorporates a variable representing what is known as Housing Equity Withdrawal. Adopting the same assumptions as in the previous equations, the first model shows an impact amounting to a reduction of one half-point in consumption over the two years, while the second model indicates a somewhat smaller impact.

I. The housing market still dynamic but showing signs of running out of steam

The American housing market still seems to be generally in good health. Starts were in fact very dynamic at the beginning of 2006, thanks to particularly mild weather conditions. The rally was short lived, however. In addition, sales of housing began to slow down, under the influence of the rise in prices and the interest-rate hikes, which finally began to affect first-time buyers, so that applications for mortgages gradually weakened. Even so, according to the specialised bodies, the most probable scenario for the housing market remains a soft landing.

The housing market still showing fairly positive tendencies

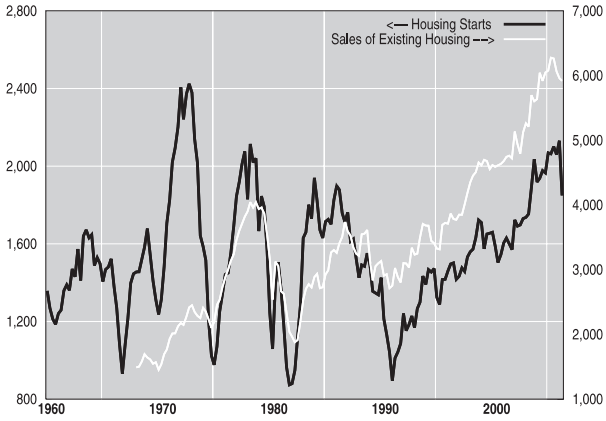
Since the trough seen in 1991, there has been no let-up in the positive orientation of the United States housing market. Starts have even reached historically high levels, close to those seen towards the end of the 1970s (*see Graph 1*). In recent months, however, they have shown a tendency to level off, apart from a brief rally at the very beginning of 2006 due to the need for reconstruction following the damage caused by hurricanes Katrina and Rita and to the particularly mild winter. February, however, already saw a distinct downturn. Sales of existing housing have also shown considerable liveliness in recent years, although they began to level off in Q3 2005.

In this still generally favourable climate, the ratio of housing investment to GDP in value has risen further. Indeed, it has practically never stopped rising since the beginning of 1991 and now exceeds 6%, the highest level for 35 years (*see Graph 2*). Meanwhile, the tendency in house prices has been generally upward. Between 1995 and 2005, prices practically doubled and over the same period the index of single-family house price index published by the OFHEO (Office of Federal Housing Enterprise Oversight) rose by 60% in real terms (*see Graph 3*). The median price of new housing posted a slightly more modest rise of the order of 40 %, while the median price of existing housing rose by more than 50%.

Is the American housing market posing a threat ?

1

HOUSING STARTS AND SALES OF EXISTING HOUSING

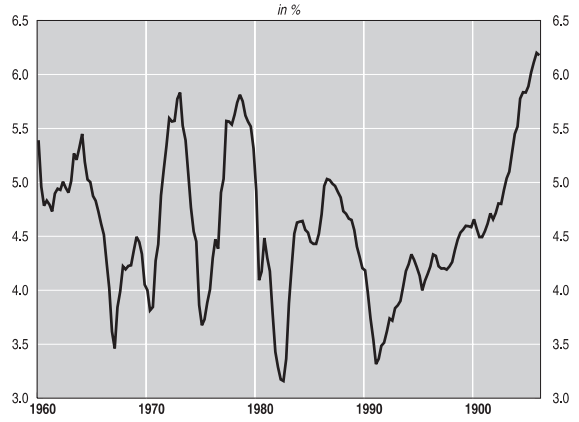


sources: Census, National Association of Realtors

2

HOUSING INVESTMENT RATIO IN VALUE

in %

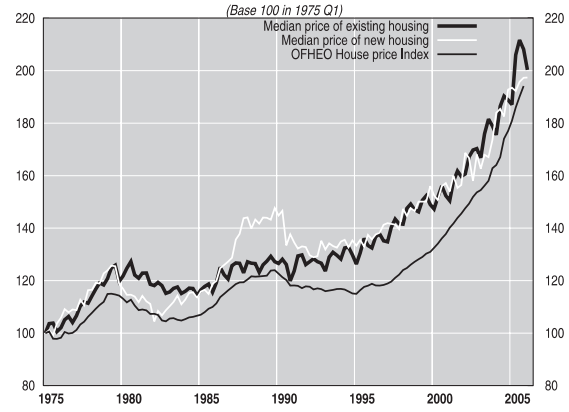


sources: BEA

3

REAL HOUSE PRICES

(Base 100 in 1975 Q1)



sources: National Association of Realtors, Census, OFHEO

A rise in house prices mainly linked to structural factors (strict planning rules, demographic tendencies) and to particularly favourable financing conditions

Despite the soaring prices, most recent studies (*cf. [17] and [18]*) rule out the existence of a genuine housing bubble at national level. In particular, this was the conclusion of the OECD study, which put the overvaluation of the market at only 1.8% in 2004.

This estimate was based on the idea that, in equilibrium, the taking of innumerable decisions whether to rent or buy should lead to equality between rents and the cost of ownership, the latter being estimated as the product of the price of housing and the "user cost of housing". This user cost is by definition a function of the after-tax interest rate on the loan (allowing for possible deductions of interest payments from taxable income), the rate of any property tax, the expected annual growth rate in the value of the asset (i.e., the expected capital gain), the depreciation of maintenance costs and the risk premium on property investment.

According to this approach, in equilibrium the price-to-rent ratio must be equal to this user cost. Adopting this framework, the overvaluation is estimated using the comparison between the observed price-to-rent ratio and the theoretical ratio corresponding to the value of the user cost. In practice, despite the fact that the price-to-rent ratio rose sharply in the space of 10 years (by more than 40%), since 2000 the equilibrium value and the observed value of the price-to-rent ratio appear to have moved in parallel, with a negligible gap between them. On this criterion, there would therefore seem to have been hardly any overvaluation on the housing market, at least on a national scale.

The uninterrupted upward momentum in prices would on this basis be explained mainly by structural factors. The strict town planning rules seem to have created greater rigidity of supply and hence price rises (*cf. [17]*). In certain conurbations, tough planning regulations have considerably curbed the construction of housing, limiting supply and leading to an increase in prices not only in the districts immediately concerned but also in neighbouring districts. This seems to have been particularly true in the cases of California, Massachusetts, New Hampshire, New Jersey and Washington DC.

Demographic tendencies also seem to have played a substantial role (*cf. [12]*), inasmuch as several phenomena of this kind have been a feature of recent years — and seem likely to intensify in the future. First, the baby-boom generations, through their sheer numbers and their accumulated wealth, have fuelled the growth in demand, notably for second homes. A similar tendency has been shown by the second generation of immigrants, who have enjoyed higher incomes than their predecessors. At the same time, the shift away from the traditional family model (couples with children) towards single-parent or reconstituted families or people living alone has led not only to a rise in demand for housing but also to modifications in the types of housing being sought. Finally, and this is partly linked to the previous factors, investment in housing for rent has probably played an appreciable role in sustaining the liveliness of the housing market (*cf. [17]*). In fact, sales attributable to this type of investment amounted to 15% of all housing sales in 2004, well above the normal figure of 5%.

At a more fundamental level, the maintenance of low interest rates (*see Graph 4*) has considerably underpinned the demand for housing. However, this factor is now tending to fade under the impact of the interest-rate hikes carried out by the US Federal Reserve since mid-2004. Nominal mortgage interest rates have put on more than 80 basis points since June 2005.

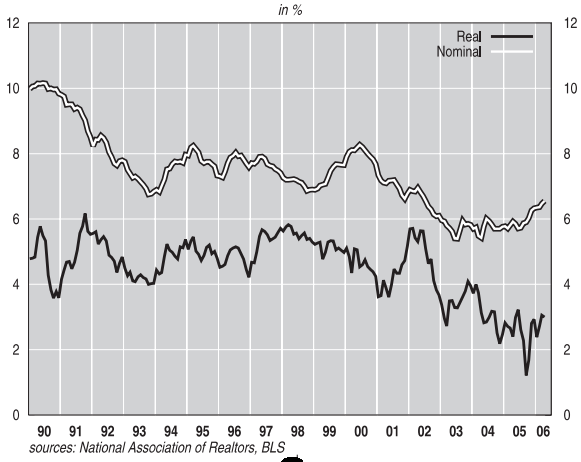
A deterioration in housing affordability that could well tend to curb the housing market

Households are now facing increasing financial constraints. Without showing any very great acceleration, their debt service rose during 2005 to more than 13.5% of gross disposable income (GDI). Meanwhile, their debt ratio is now looking high, being in excess of 120% of GDI. In these circumstances, mortgage applications are showing signs of a downturn, having apparently peaked in H2 2005 (*see Graph 5*). Another sign of imminent levelling-off is the deterioration in housing affordability (*see Graph 6*). Affordability has in fact been deteriorating almost continuously since mid-2004, under the impact of the surge in prices and the interest-rate hikes. All in all, confidence on the housing market has been weakening appreciably since the end of last year (*see Graph 7*).

4

MORTGAGE INTEREST RATE

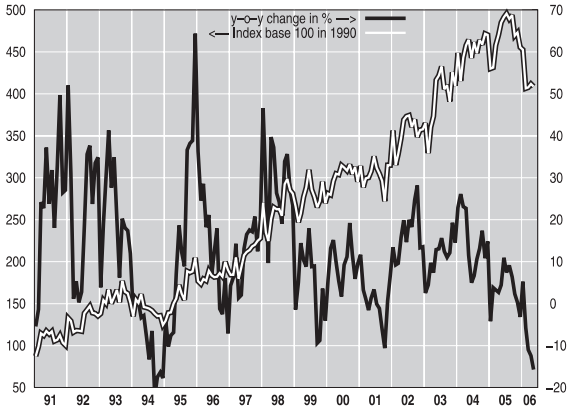
in %



sources: National Association of Realtors, BLS

5

INDEX OF MORTGAGE APPLICATION ACTIVITY



source: Mortage Bankers Association of America Weekly Survey

Even so, the most likely scenario remains a soft landing

Despite the first signs of levelling-off in the housing market, most of the specialised bodies are expecting a soft landing (*cf. [13], [14], [15], [16]*). Taking the recent orders of magnitude provided by these institutions, average evolutions were chosen for the purpose of subsequently simulating the effects of the housing slowdown on households' investment and consumption (*see Table 1*). For example, starts are assumed to decline already in 2006 (by 4.5%, followed by 5.0% in 2007). Sales of existing housing, taking into account the deterioration seen this winter, are expected to show a distinct (5.0%) decline in 2006 and then in 2007 a decline of less than half as much (2.0%). Real prices of housing, meanwhile, are expected to rise in 2006 at one third of the rate seen in 2005 (i.e. by 3.5%) and then half as fast again in 2007 (2.0%). Finally, mortgage interest rates are expected to rise by 90 basis points over the two years. In the end, the easing of prices and the rise in interest rates are expected to lead to a downturn in households' housing wealth (*see below, as well as the estimate shown in Box 3, equation 5*).

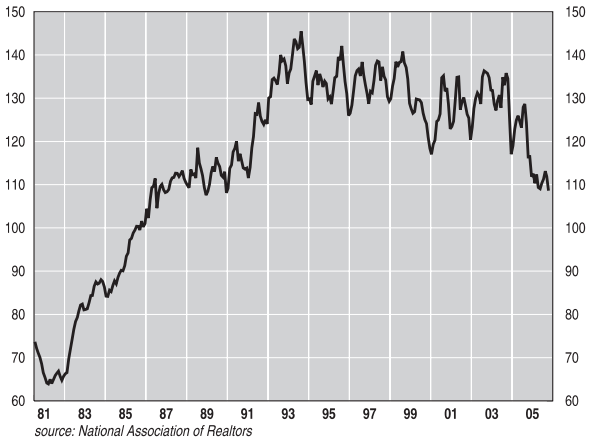
Table : Housing market forecasts

Annual change in %

	2005	2006	*2006 (*)*	2007
Housing starts				
Freddie Mac		-4.1	-4.8	-6.8
Mortage Bankers Association		-6.1	-6.2	-3.5
National Association of Realtors		-3.2	-4.1	-7.6
Chosen scenario	6.3		-4.5	-5.0
Sale of existing housing				
Freddie Mac		-7.0		-4.0
Mortage Bankers Association		-7.1		-3.3
National Association of Realtors		-6.0		1.1
Chosen scenario	4.4		-5.0	-2.0
Median price of existing housing				
Freddie Mac				
Mortage Bankers Association		6.2	6.1	4.7
National Association of Realtors		6.0	5.7	4.8
Chosen scenario	12.8	-	-	-
Median price of new housing				
Freddie Mac				
Mortage Bankers Association		2.6	8.2	3.7
National Association of Realtors		2.2	6.6	5.6
Chosen scenario	7.5	-	-	-
Real house prices OFHEO				
Chosen scenario (1)	10.1		3.5	2.0
30-year mortgage interest rate				
Freddie Mac		6.4		6.6
Mortage Bankers Association		6.5		6.8
National Association of Realtors		6.6		7.0
Chosen scenario	5.9	6.5		6.8

(*) Including data for the early part of the year
(1) The OFHEO price index is dominated by the evolution of prices of existing housing

6
HOUSING AFFORDABILITY INDEX



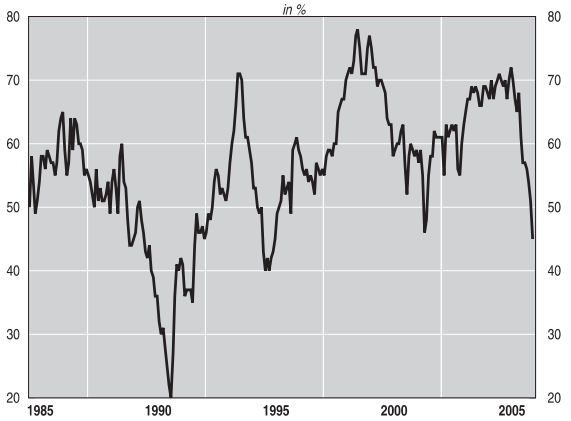
source: National Association of Realtors

How to read the indicator:
The indicator is equal to 100 if a household receiving the median income can obtain a loan in order to buy an asset at the median price. A fall in the indicator signifies that a household receiving the medium income has increasing difficulty in buying an asset at the median price.

II. A potential impact of the easing of the housing market on households' investment of the order of 8 points between now and end-2007

Households' investment is likely to feel the first effects of the slowdown on the housing market. Two different approaches have been used to arrive at an order of magnitude of the potential impact. The first is based on the expected evolution in starts and in sales of housing. The second, complementary, approach is based on the determinants of purchasing decisions. The aim is to see to what extent the easing of house prices and the rise in interest rates are liable to influence housing investment.

7
REAL ESTATE CONFIDENCE INDEX
in %



sources : National Association of Home Builders

An "accounting" approach suggesting a relatively pronounced slowdown in housing investment

Housing investment includes both the construction of new dwellings and all expenditure spent by households on home improvements. These two components are indirectly taken into account through the evolution in starts, on the one hand, and sales of existing housing, on the other.

The fit obtained (*see Box 1, equation 1*) is fairly satisfactory, although it under-estimates the rise in investment towards the end of the period (*see Graph 8*). For forecasting purposes, the evolutions of two explanatory variables of the type set out in Table 1 were introduced. Keeping the contribution of the residual of the fit constant at the level observed in the past two years, it is estimated that housing investment could fall by 1% in 2006 and by 2% the following year.

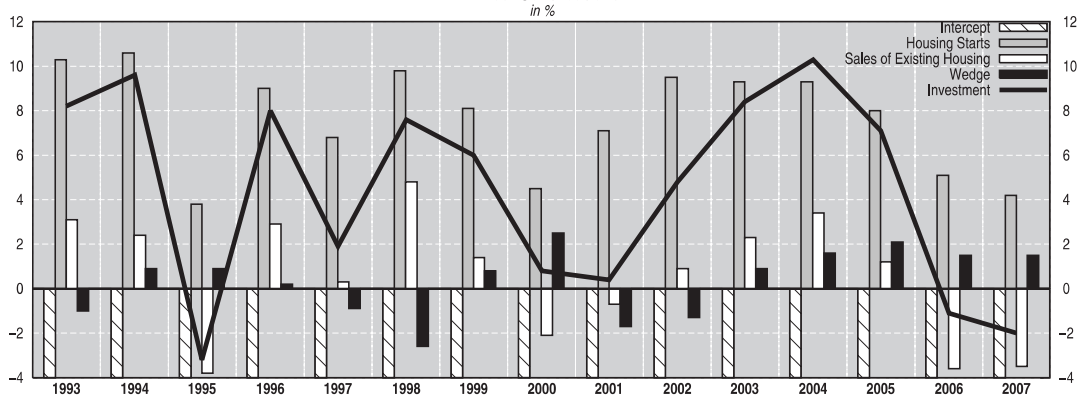
A more economic modelling of housing investment leads to an equally large, but more gradual, fall

As an alternative to the largely accounting approach described above, a second model describes investment behaviour in terms of the variables having the greatest determining power regarding house purchase decisions, i.e. the respective evolutions in real gross disposable income, real wealth and interest rates (*see Box 1, equation 2*). The analytical framework explored here can be compared to that traditionally adopted for the estimation of the consumption equation (*see below for more details*). The theoretical foundations are nevertheless less clear-cut, as has been recalled by the authors of study [1]: "to our knowledge few theoretical studies have been made of housing investment behaviour", notably because this expenditure item is in the final analysis relatively heterogeneous.

As in the previous case, the simulation obtained under-estimates investment in the recent past and notably in 2005 (*see Graph 9*). It should be noted that housing wealth seems to have played an important role in investment growth in that year. This phenomenon is to be related to the results of the latest survey of households' financial situations (*cf. [5]*). In fact, it indicates that the rise in house prices has enabled households to extract liquidity (*for example, by taking out a new loan on the security of their home*), practically half of which is used for home improvements, automatically adding to investment.

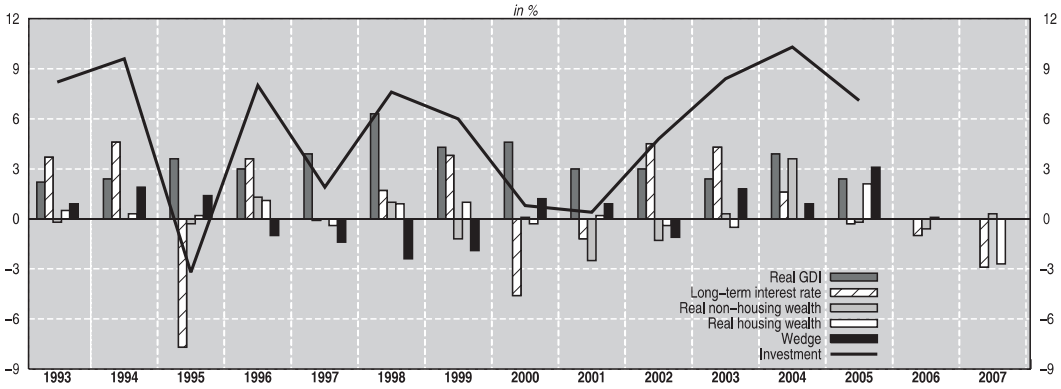
What would seem to be of interest from a forecasting standpoint is the effect of the expected easing in house prices (and, as a result, in housing wealth, *cf. below and also Box 3, equation 5 for the modelling adopted*) and of the rise in interest rates (using the orders of magnitude provided in Table 1). This impact can be seen directly through the marked declines in the contributions of these two variables to the simulated investment (*see Graph 9*). It emerges that, everything else remaining equal,

8
RESIDENTIAL INVESTMENT – EQUATION
Annual Contributions
in %



sources : BEA, Census, National Association of Realtors, calculs Insee

9
RESIDENTIAL INVESTMENT
Annual Contributions
in %



sources : BEA, Fed, BLS, Insee calculations

the result is to lop 3.5 points off investment growth in 2006 and 4 points in 2007.

In total, the cumulative effect over the two years is, according to both the approaches used, a reduction in investment of the order of 8 points (or roughly 0.5 of a GDP point). However, the impact is concentrated to a greater extent on 2006 if one takes the fit made by taking starts and housing sales. Conversely, and fairly naturally, the behavioural equation smooths the impact of the slowdown in the housing market over time.

It is worth recalling that the orders of magnitude proposed here are largely contingent on the assumptions adopted for the explanatory variables. By way of comparison, study [9] arrives at a much more substantial effect, i.e. a drop in housing investment of the order of 15% to 30%. However, this evaluation is based on a huge drop in starts (between 15% and 30%) and is equivalent, according to the authors, to bringing the investment/GDP ratio in value back down to its average level for the past 25 years. These assumptions, although obviously impossible to rule out, correspond to a scenario that is not widely accepted at present.

III. Household consumption growth could be reduced by one half-point over the next two years under the impact of the slowdown in the housing market

The first signs of a levelling-off in the housing market could also raise fears of an easing of household expenditure in coming quarters, notably because of the accompanying reduction in wealth effects. In order to provide an indication of the potential quantitative impact of this phenomenon, two behavioural equations were estimated. The first introduces the standard determinants (essentially, income and wealth), while the second, adopting in this respect certain more recent approaches, introduces a variable representing housing equity withdrawal (HEW).

The effect of the easing of the housing market on household consumption is in both cases captured as follows: a downturn in house prices is liable to be reflected sooner or later in a levelling-off in wealth (or in HEW) that will be liable to curb household consumption. In other words, three successive stages are presented:

- the first consists of estimating the consumption equation incorporating the wealth effect (or the HEW);
- the second attempts to establish a relationship between wealth (or HEW) on the one hand and house prices and interest rates, on the other;
- the third and final stage makes it possible, on the basis of the assumptions made in Table 1, to exploit the equations obtained in the second stage in order to incorporate them subsequently in the consumption equations arrived at in the first stage.

Estimation of the consumption equations highlights the significant influence of mortgage lending (first stage)

The impact of the wealth effect on consumption is traditionally analysed within the framework of the permanent income theory or the life-cycle model, according to which the level of consumption depends on households' permanent income, i.e. their total flow of current and expected income, as well as on the stock of wealth. For any expected level of permanent income, households are assumed to adjust their spending over the whole of their life-cycles, borrowing when they are young, saving during their working lives and dissaving when they are older. An unexpected rise in wealth prompts households to spread the gain in wealth over the whole of their life-cycles, thus spending slightly more and saving slightly less.

These theories make it possible to distinguish two different channels for the financing of expenditure. First, the increase in wealth directly permits increased spending when households liquidate their assets. The other channel operates through the fact that the increase in wealth increases borrowing capacities, thus in the end stimulating spending by households who had been subject to liquidity constraints. Several studies present estimated consumption equations incorporating wealth effects (*cf. [2], [3], [4], [6], [8] and [11]*). The determining factors introduced are generally as follows: current and lagged real gross disposable income (or real labor income), the stock of wealth (sometimes with a distinction between financial and housing wealth), the unemployment rate, interest rates and inflation.

Graph 10 presents the results of dynamic simulations obtained using a traditional behavioural equation (*see Box 2, equation 3*). These seem to be relatively satisfactory.

An alternative approach was explored with the aim of introducing a HEW variable, according to the approach recently proposed by Catte et al. (*cf. [6]*). The underlying idea is to use an indicator making it possible to measure the extent to which households are in a position to extract liquidity from the housing market. HEW is in fact calculated as the difference between the net increase in mortgage debt and the evolution in households' housing investment. This indicator tends to be positive when households renegotiate their existing mortgages or when they take out a new mortgage on the same asset in order to take advantage of the increase in housing wealth. When this indicator increases, households have more liquidity at their disposal for the purpose of consumption. One therefore expects to see a positive relationship between consumption and HEW(1).

The essential advance compared with the previous equation lies in the introduction into the long-term relationship of a variable relating directly to the housing market (*see Box 2, equation 4*). Furthermore, the dynamic simulations obtained (*see Graph 11*) provide better results than the previous equation for the years 2004 and 2005.

The link - theoretically non-trivial - between house prices and wealth (second stage)

After highlighting the impact of housing wealth (or HEW) on consumption, it is now time to relate the evolution in house prices to wealth (or HEW). In theory, the link between house prices and net housing wealth is non-trivial. A rise in house prices may simply reflect a worsening housing shortage due to a rise in demand, without there necessarily being any net increase in the quantity or quality of the service rendered by housing — in which case there is no modification in national wealth.

Empirically, a modelling of real household wealth can nevertheless be obtained by taking the real price of housing and simply proceeding to estimate an equation linking these two variables with long-term interest rates (*see Graph 12 and Box 3, equation 5*).

In the same way, an attempt was made to establish a simple econometric relationship, in the form of an error-correction model, between the HEW indicator, house prices and long-term interest rates. However, this sometimes fails to take proper account of the variability of HEW (*see Graph 13 and Box 3, equation 6*).

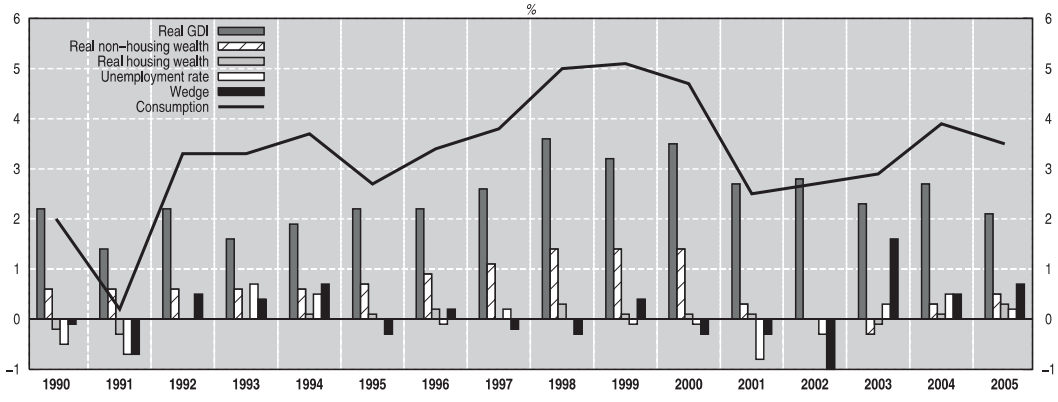
A greater impact obtained using the traditional wealth-effect approach than using HEW (third stage)

The evolution in consumption was simulated for the period to end-2007 using the various instruments described here, taking the assumptions appearing in Table 1. The orders of magnitude obtained

(1) HEW as calculated here is similar to the Mortgage Equity Withdrawal (MEW) used by the Fed (cf. [10]). It was not possible to exploit MEW directly in the estimate, because no long-period series has been published, nor was it possible to recalculate the series, because of data availability problems. For this reason, it was decided to proceed with a very simple calculation using HEW, as this variable turns out, a posteriori, to be closely correlated to the MEW provided by the Fed (correlation coefficient of 0.93).

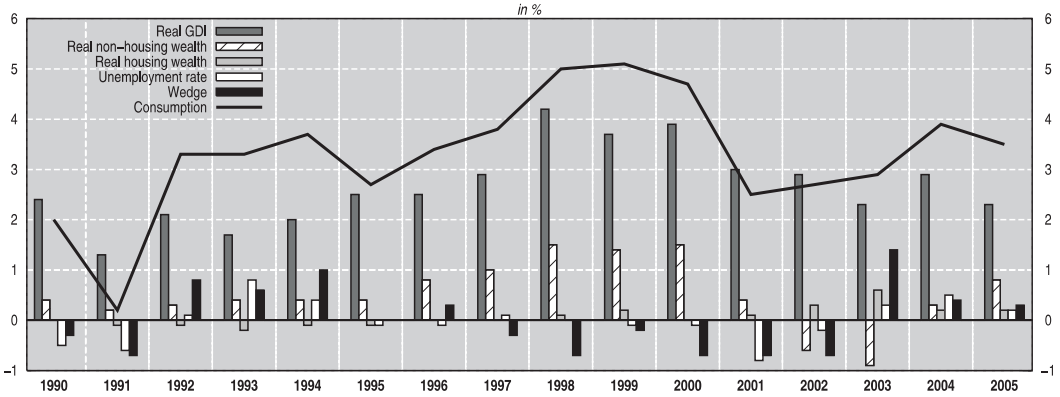
10

CONSUMPTION INCORPORATING WEALTH VARIABLES
Main annual Contributions



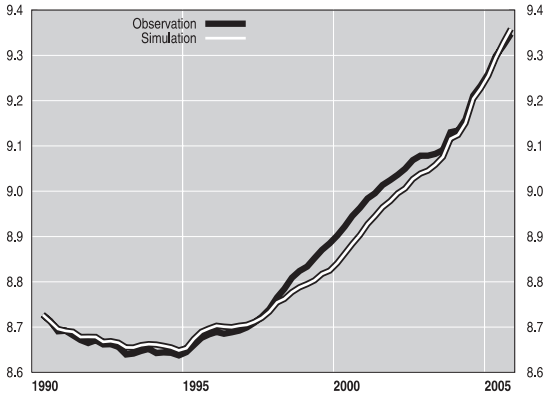
sources: BEA, Fed, BLS, Insee calculations

11
CONSUMPTION INCORPORATING THE HEW
Main annual Contributions
in %



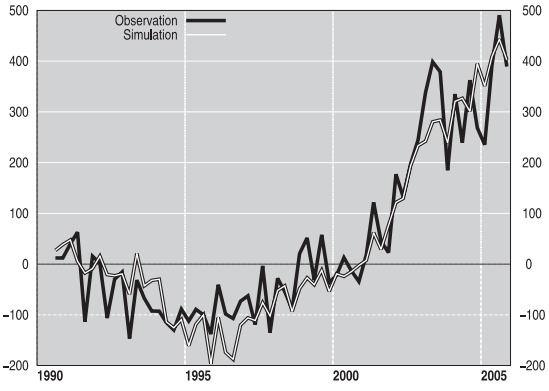
sources : BEA, Fed, BLS, Insee calculations

12
LOGARITHME OF HOUSING WEALTH
quarterly levels



source : Fed, Insee calculations

13
REAL HEW
quarterly levels



sources : BEA, Fed, Insee calculations

are "everything else remaining equal". In particular, the impact of the rise in interest rates is taken into account only via its impact on housing wealth (or HEW) but ignoring any possible implications for interest payments (and hence for GDI). In fact, however, the renewed recourse to variable rates (less than 20% of mortgages were contracted at adjustable rates in 2003, compared with more than 30% in 2005) ould mean that this aspect is no longer negligible. Similarly, the possible impact of a soft landing for the housing market on job creations, notably in the construction sector, is not incorporated.

The traditional consumption equation (including the wealth effect, equation 3) would lead to the cancelling-out of the contribution of housing wealth to simulated consumption as of 2006 (following a positive contribution of 0.3 of a point in 2005), followed by a further deterioration to -0.3 of a point in 2007. In consumption equation 4, it turns out that the contribution of HEW remains high in 2006 and 2007 at around 0.3 of a point (compared with only 0.2 of a point in 2005 as a result of a sharp dip in HEW in the first quarter). Using this alternative modelling, the impact of the easing on the housing market turns out to be much smaller than that simulated with the help of the traditional equation. This can probably be related to the fact that the projection of the HEW variable, although weakening, is probably too smooth to depict its potential evolution in the event of an easing of house prices.

All in all, however, both the instruments presented here reach the conclusion of a circumscribed impact of an easing of the housing market on consumption (of the order of -0.5 of a point in two years, on the assumption of a gradual slowdown in prices and a progressive rise in long rates). ■

BOX 1: THE ESTIMATION OF HOUSING INVESTMENT EQUATIONS

First estimation: fit based on starts and house sales

Equation 1 takes the following form:

$$DLINVEST = \underset{1,19}{0,002} + \underset{5,60}{0,164} * DLMTOT + \underset{3,99}{0,130} * DLMTOT(-1) - \underset{-2,03}{0,046} * DLMTOT(-4)$$
$$- \underset{-2,81}{0,060} * DLMTOT(-8) + \underset{6,73}{0,252} * DLVANC + \underset{2,49}{0,100} * DLVANC(-1) + \underset{2,00}{0,075} * DLVANC(-2) + \underset{2,60}{0,233} * DLINVEST(-1)$$

Adjusted $R^2 = 0.86$

Estimation period: Q1 1990 to Q2 2005

Second estimation: behavioural equation

This equation was estimated in two stages. First, the long-term relationship was shown using the Stock and Watson method. Next, the residual of this first equation, being stationary, was introduced into the estimation of a short-term relationship.

<u>First stage: long-term relationship using equation 2</u>:

$$LINVEST = \underset{-4,42}{-3,551} + \underset{13,46}{1,120} * LY - \underset{-3,59}{0,038} * TXLT$$

<u>Second stage: short-term relationship using equation 2:</u>

$$DLINVEST = \underset{-2,42}{-0,006} - \underset{-3,70}{0,168} * EPSILONI(-1) + \underset{3,74}{0,775} * DLY - \underset{-2,42}{0,017} * DTXLT(-1)$$
$$+ \underset{5,77}{0,502} * DLINVEST(-1) + \underset{3,31}{0,187} * DLWNI(-2) + \underset{2,38}{0,342} * DLWI(-2)$$

Adjusted $R^2 = 0.68$

Estimation period: Q1 1990 to Q2 2005

BOX 2: THE ESTIMATION OF THE CONSUMPTION EQUATIONS

First estimation: the standard behavioural equation

The standard equation adopted here was obtained through a two-stage process. First, the long-term relationship was estimated using the Stock and Watson method. Next, the residual of this first equation, being stationary, was introduced into the estimation of the short-term relationship.

First stage: Long-term relationship using equation 3:

$$LCONSO = \underset{-22,17}{-0,543} + \underset{16,43}{0,166} * LWNI + \underset{72,89}{0,861} * LY$$

Second stage: Short-term relationship using equation 3:

$$DLCONSO = \underset{5,56}{0,005} - \underset{-3,56}{0,105} * EPSILON0(-1) + \underset{5,78}{0,256} * DLY + \underset{1,99}{0,031} * DLWNI(-1) - \underset{-1,82}{0,029} * DLWNI(-3)$$
$$+ \underset{1,81}{0,047} * DLWI(-1) + \underset{3,13}{0,207} * DLCONSO(-2) - \underset{-1,98}{0,123} * DLCONSO(-4) + \underset{3,83}{0,020} * D2001T4$$
$$- \underset{-6,35}{0,011} * DTXCHOM + \underset{2,73}{0,005} * DTXCHOM(-1)$$

Adjusted $R^2 = 0.46$

Estimation period: Q4 1960 to Q2 2005

This estimation calls for certain remarks.

- Only the non-housing component of wealth plays a significant role in the long-term relationship. The introduction of housing wealth upsets the quality of the residual and subsequently weakens the restraining force. This explains why it was not possible to retain this variable.
- Housing wealth nevertheless plays a role in the short-term relationship, making the interest rate non-significant.
- The introduction of inflation was inconclusive.

Second estimation: an equation introducing a variable representing HEW

The estimation method was the same as above.

First stage: long-term relationship using equation 4:

$$LCONSO = \underset{6,94}{0,355} + \underset{17,78}{5,74\ 10^{-6}} * WNI + \underset{3,54}{5,08\ 10^{-5}} * HEWR$$

Second stage: short-term relationship using equation 4:

$$DLCONSO = \underset{5,84}{4,62\ 10^{-3}} - \underset{-4,41}{0,140} * EPSILONHEW(-1) + \underset{6,38}{0,281} * DLY + \underset{1,61}{1,06\ 10^{-5}} * DHEWR$$
$$+ \underset{2,63}{0,174} * DLCONSO(-2) + \underset{3,87}{0,020} * D2001T4 - \underset{-6,79}{0,010} * DTXCHOM + \underset{2,88}{4,90\ 10^{-3}} * DTXCHOM(-1)$$

Adjusted $R^2 = 0.45$

Estimation period: Q4 1960 to Q2 2005

BOX 3: THE ESTIMATION OF THE WEALTH AND HEW EQUATIONS

First estimation: the housing wealth equation

Equation 5 takes the following form:

$$DLWI = \underset{0,16}{0,001}\,10^{-1} + \underset{19,41}{1,239} * DLOFHEO - \underset{-2,84}{0,435} * DLOFHEO(-2) + \underset{2,73}{0,291} * DLWI(-2) + \underset{2,48}{0,120} * DLWI(-4) + \underset{2,57}{0,004} * DTXLT(-3) - \underset{-4,98}{0,006} * DTXLT(-11)$$

Adjusted $R^2 = 0.92$

Estimation period: Q1 1990 to Q2 200

Second estimation: the HEW equation

The equation was obtained through a two-stage process. First, the long-term relationship was estimated using the Stock and Watson method. Next, the residual of this first equation, being stationary, was introduced into the estimation of the short-term relationship.

First stage: Long-term relationship using equation 6:

$$HEWR = \underset{-11,87}{-7311,8} + \underset{11,78}{1359,4} * LOFHEO$$

Second stage: short-term relationship using equation 6:

$$DHEWR = \underset{-1,98}{-17,428} - \underset{-3,89}{0,280} * EPSILONR(-1) - \underset{-4,89}{0,546} * DHEWR(-1) - \underset{-2,36}{0,248} * DHEWR(-2) - \underset{-3,46}{67,508} * DTXLT(-1) - \underset{-2,73}{51,983} * DTXLT(-6) + \underset{1,93}{32,147} * DTXLT(-13)$$

Adjusted $R^2 = 0.56$

Estimation period: Q1 1990 to Q2 2005

Name	Mean	Source
D2001T4	Dummy at Q4 2001 (automobile premium)	
DHEWR	Difference of real Housing Equity Withdrawal	Flows of Fund, BEA
DLCONSO	Difference of log of household consumption in volume	BEA
DLINVEST	Difference of log of residentiel investment in volume	BEA
DLMTOT	Difference of log of housing starts	Census
DLOFHEO	Difference of log of real house prices	OFHEO, BEA
DLVANC	Difference of log of sales of existing housing	Nat. Ass. of Realtors
DLWI	Difference of log of real housing wealth	Flows of Fund, BEA
DLWNI	Difference of log of real non-housing wealth	Flows of Fund, BEA
DLY	Difference of log of real gross disposable income	BEA
DTXCHOM	Difference of unemployment rate	BLS
DTXLT	Difference of the long-term interest rate	FRB
EPSILONI	Residual of the long-term residentiel investment equation	
EPSILONR	Residual of the long-term equation (housing equity withdrawal equation)	
EPSILON0	Residual of the long-term household consumption equation (first estimation)	
EPSILONHEW	Residual of the long-term household consumption equation (second estimation)	
HEWR	Real housing Equity Withdrawal	Flows of Fund, BEA
LCONSO	Log of household consumption in volume	BEA
LINVEST	Log of residentiel investment in volume	BEA
LOFHEO	Log of real house prices	OFHEO, BEA
LWNI	Log of real non-housing wealth	Flows of Fund, BEA
LY	Log of real gross disposable income	BEA
TXLT	Mortgage interest rate	FRB
WNI	Real non-housing wealth	Flows of Fund, BEA

Bibliography

[1] Baghli M., Brunnhes-Lesage V., De Bandt O., Fraisse H., Villetelle J-P. (2004), "Mascotte : modèle d'analyse et de prévision de la conjoncture trimestrielle", Banque de France, Notes d'études et de recherche No.106

[2] Beffy P-O., Chataignault C., Monfort B., Thesmar D. (2001), "L'effet richesse en France et aux États-Unis", INSEE, Note de conjoncture, December

[3] Boone L., Girouard N. (2002), "The stock market, the housing market and consumer behaviour", OECD Economic Studies No.35, 2002/2

[4] Borgy V. (2005), "Les canaux de transmission de la richesse immobilière", OECD/CEPII Club, "The Real Estate Bubble" Programme

[5] Bucks B., Kennickell A., Moore K. (2006), "Recent changes in U.S. Family Finances : Evidence from the 2001 and 2004 Survey of Consumer Finances", Federal Reserve Bulletin

[6] Catte P., Girouard N., Price R., André C. (2004), "Housing markets, wealth and the business cycle", OECD Economic Department Working papers No. 394

[7] Coville T. (2005), "L'impact du cycle immobilier sur la croissance américaine", COE, Lettre mensuelle de conjoncture No.486

[8] Dudley B., Hatzius J., McKelvey Ed., Tilton A., Fuentes M. (2005), "Mortgage Equity Withdrawal : the key issue for 2006", Goldman Sachs, US Economics Analyst No..05/46

[9] Dudley B., Hatzius J., McKelvey Ed., Tilton A. (2006), "Q&A on the Housing Cycle : Movin' On Down", Goldman Sachs, US Economics Analyst No.06/13

[10] Greenspan A., Kennedy J. (2005), "Estimates of Home Mortgage Originations, Repayments, and Debt On One-to-Four-Family Residences", Federal Reserve Board, Finance and Economics Discussion Series No.41

[11] Hatzius J., Dudley B., McKelvey Ed., Tilton A. (2005), "2006: The turn in the interest rate cycle", Goldman Sachs, US Economics Analyst No.05/52

[12] Joint Center for Housing Studies of Harvard University (2005), "The State of the Nation's Housing 2005"

[13] Mortgage Bankers Association (2005), "Assessing risks in the Consensus Forecast", Economic Commentary, December

[14] National Association of Realtors (2005), Real Is State Insight, December

[15] National Association of Realtors (2005), "Historically strong home sales expected in 2006", December forecast for 2006

[16] Nothaft F., Richardson N., Schoenbeck M. (2005), "'Tis the Season", Freddie Mac, December Economic Outlook

[17] OECD (2005), "Recent house price developments: the role of fundamentals", Economic Outlook No. 78

[18] Société Générale (2005), "L'immobilier américain sur le fil du rasoir", Focus, December