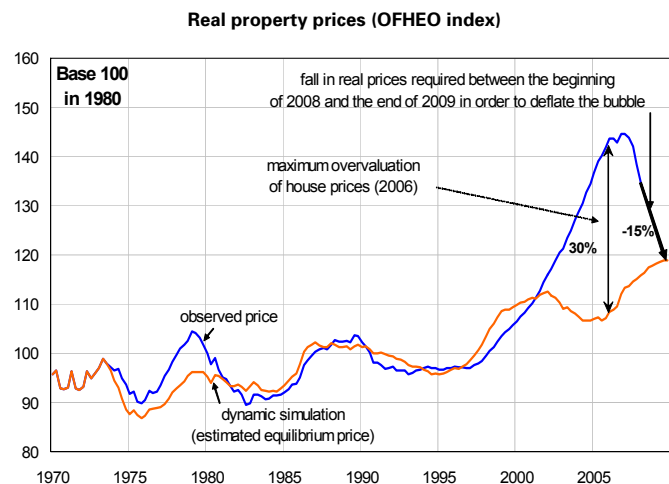


## The bursting of the US house price bubble

- US house prices rose by nearly 60% in nominal terms between 2000 and 2006, before starting to fall in the summer of 2007.
- The price rise was driven by strong growth in housing demand coupled with relatively scarce supply due to a shortage of available land in the most urban states and, perhaps, weak competition in the construction sector. In addition, housing demand was fuelled by unsustainable factors, including easier access to mortgage loans, excessive expectations concerning house price increases and durably accommodative monetary policy.
- To assess the scale of the coming price adjustment, we need to know the long-term equilibrium of house prices. This depends on construction costs as well as on housing demand, given that land scarcity is a constraint on housing supply in the most urbanised states.
- According to our analysis, house prices were overvalued by nearly 30% in 2006. To eliminate the bubble entirely, and taking into account the fall in prices in 2007, we estimate that real house prices would need to continue to fall by roughly 15% between the beginning of 2008 and the end of 2009, or by approximately 10% in nominal terms.
- This house price decline could have serious consequences for the American economy. It could have a direct impact on activity in the construction sector, as well indirect impact on household consumption via a housing wealth effect. It could affect inflation via a slowdown in rents, which account for a hefty share of core inflation, and it could affect mortgage default rates, with consequences for financial institutions' balance sheets and hence the distribution of credit. All these factors are playing a part in the overall slowdown in the American economy.

This study was prepared under the authority of the Treasury and Economic Policy General Directorate and does not necessarily reflect the position of the Ministry for the Economy, Industry and Employment.

Sources: OFHEO, DGTPE calculations.



## Box 1: choosing the most relevant house price index

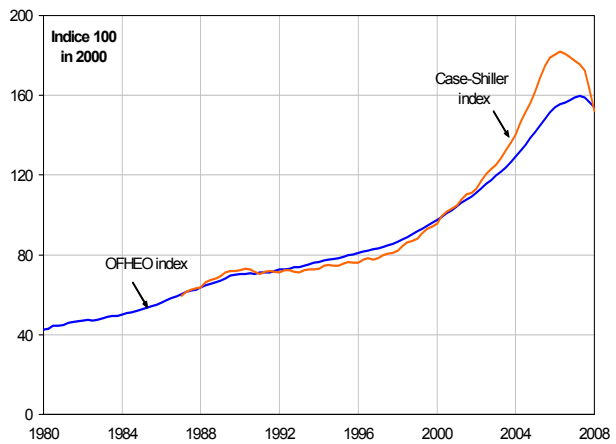
There are several house price indexes in the United States, the most widely followed being the Office for Federal Housing Enterprise Oversight (OFHEO) index and the S&P/Case-Shiller index. Both have the advantage of using the so-called "repeated sales method", developed in the 1960s and extended in the late-1980s by the work of K. Case and R. Shiller. The general principle behind this method involves observing changes in the price of a given home over a series of sales episodes, thus avoiding variations in the composition of the sample. However, the sample is augmented as and when new homes are built.

The OFHEO index is constructed mainly on the basis of data gathered by Freddie Mac and Fannie Mae, the two mortgage lenders that enjoy an implicit Federal guarantee and are overseen by the OFHEO. It covers the whole of US territory well, but ignores the price of homes bought with jumbo-type loans (amounts over \$417,000 in 2007) or subprime loans, since Freddie Mac and Fannie Mae are not authorised to securitize these types of loan.

The S&P/Case-Shiller index does take into account the prices of homes bought with all types of mortgage loan, jumbo and subprime included, but its geographical coverage is less satisfactory: it covers 70% of US territory overall<sup>a</sup>, but with widely varying coverage rates depending on the state (ranging from 0% to 100%). Another drawback is that it has only existed since 1987, versus 1975 for the OFHEO.

A study by the OFHEO in 2007<sup>b</sup> shows that, correcting for the difference in geographical coverage, the variations in the two indexes are roughly comparable.

Chart 1: variations in the two main indexes



Source: OFHEO, S&P/Case-Shiller.

This suggests that the bias introduced by the non-inclusion of jumbo and subprime loans in the OFHEO index has been fairly small until now.

Moreover, data on households' real estate wealth published by the FED in the Flow of Funds are based on the OFHEO index.

Consequently, this study uses the index published by the OFHEO.

a. Cf. Standard&Poors (2008) "S&P/Case-Shiller Home Price Indices - Index Methodology", *Standard&Poors Report*, March 2008.

b. Cf. Leventis A. (2007): "A note on the differences between the OFHEO and S&P Case-Shiller House Price Index", *OFHEO note* July 2007.

## 1. House prices are reckoned to have been around 30% overvalued in 2006

Nominal US house prices began to fall in mid-2007, a phenomenon unseen since the Second World War. This decline followed a spectacular price surge in the period 2001-2006, a rise that was exceptional both in scale and in its nationwide scope.

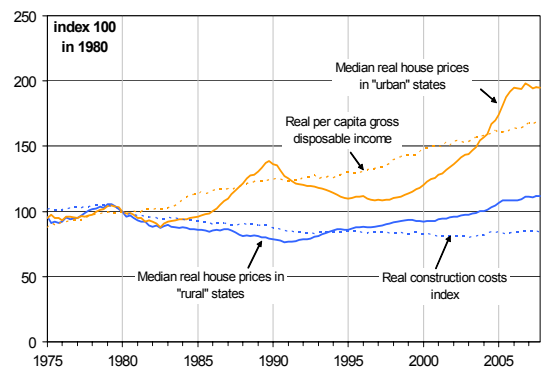
prices ought to rise no faster than construction costs<sup>1</sup>. In urban areas, on the contrary, housing supply is to a large extent constrained<sup>2</sup>, which means that housing demand is the main determinant of prices (see Chart 2 below).

### 1.1 The profile and determinants of house prices vary between urban and rural areas

House prices appear to vary greatly between regions (see Box 2). In particular, the price trend profile in "rural" states is distinguishable from that of "urban" states: real house prices in rural states appear to be relatively stable, whereas in urban states they appear to exhibit a long-term upward trend and greater volatility.

This difference stems primarily from the characteristics of the housing supply. Rural zones offer virtually limitless scope for new construction, and in the long run house

Chart 2: real house prices (urban and rural states)



Source: OFHEO, BLS, BEA, DGTPE calculations.

- (1) Note, however, that house prices can fall below construction costs in an area with a falling population (due to the rural exodus, for example). Thus in the three states where the population fell between 1980 and 1995 (North Dakota, Iowa and West Virginia), house prices fell relative to construction costs.
- (2) Glaeser, Gyourko and Saks (2004): "Why have housing prices gone up?", *NBER Working Papers no. 11129*, show that this supply constraint has increased since the early-1970s, the authorities having become distinctly more restrictive in granting building permits.

## Box 2: the geography of house prices

Distinguishing between urban states<sup>a</sup> and rural ones (which are less densely populated and have no large cities), we find that real prices vary little over time in the rural states, whereas in urban states they vary more cyclically around a rising trend since 1975: rising in the second half of the 1980s, falling in the 1990s, then rising rapidly in the early 2000s.

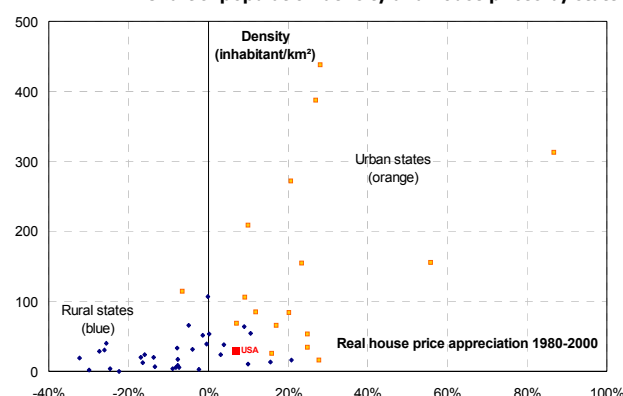
As Chart 3 (opposite) shows, between 1980 and 2000 the most significant price increases have indeed occurred in the most densely populated states (in orange), and hence probably in the urban areas, whereas prices in the less densely populated states or in states with no major cities (in blue) were relatively stable. These findings may be interpreted as follows:

- In rural areas, housing supply can adjust to demand since there is an abundance of available space. Consequently, in the long run real house prices depend solely on construction costs.
- In urban areas, housing supply is constrained by the limited space available for new building. Consequently, real house prices depend on housing demand in the long run, and hence primarily on real per capita income and mortgage rates.

Scrutiny of the available data confirms this interpretation. House prices in rural areas vary in a comparable manner to construction costs, at least until the late-1990s. In urban areas, these prices vary in proportion with real disposable per capita income in the long run (albeit with very pronounced cycles).

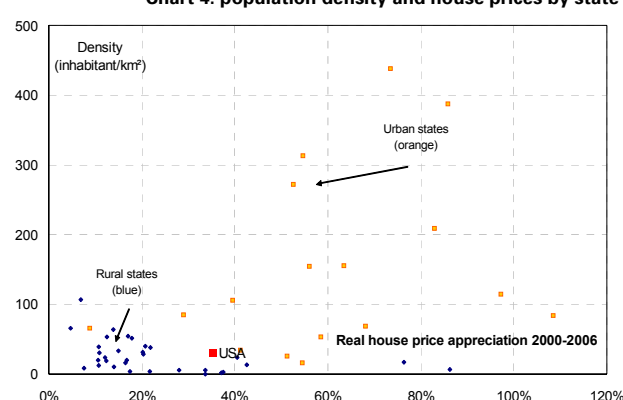
Real house prices rose nationwide between 2000 and 2006. They rose substantially in urban areas, though not unduly compared to the previous cycle. The price rise in rural areas is more surprising, since construction costs rose only very slightly over the period.

Chart 3: population density and house prices by state



Source: OFHEO, Census.

Chart 4: population density and house prices by state



Source: OFHEO, Census.

- a. The following are considered to be urban states: California, Connecticut, District of Columbia, Delaware, Florida, Illinois, Massachusetts, Maryland, Maine, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Vermont and Washington.

### 1.2 House prices at the national level can be accounted for by their determinants in the two types of area and by the relative importance of these areas

This distinction between urban and rural areas needs to be borne in mind when modelling house prices<sup>3</sup>. Thus, house prices at the national level are assumed to be written as a weighted average of prices in those areas where housing supply is constrained (slightly improperly called "urban areas") and prices in areas where this supply is not constrained ("rural areas"). It is further assumed that **in the long run**:

– *rural house prices follow construction costs*;

– *urban house prices depend solely on the determinants of housing demand*. The determinants of this demand are taken to be real per capita gross disposable income (GDI) and the real interest rate on mortgage loans. It has not been possible, econometrically, to identify the role of the other variables (i.e. households' financial wealth, unemployment rate, and demographic factors) that can also affect households' demand for housing, *a priori*.

Based on the estimation of this long-term relationship between house prices and their determinants, we can gauge the proportion of homes located in rural areas. The result is comparable to the figure advanced by Krugman (2006)<sup>4</sup>, with rural areas estimated to account for roughly 50% of the total.

- (3) In Abraham and Hendershott (1996): "Bubbles in Metropolitan Housing Markets", *Fannie Mae*, the authors make a distinction of this type, separating the (essentially urban) coastal areas, where prices are heavily dependent on household income, from inland areas, where prices are more dependent on construction costs.
- (4) "No Bubble Trouble?", article published in *The New York Times*, 2 January 2006.

**In the short run**, house price variations can be accounted for essentially by variations in housing demand.

In addition to variations in household income or mortgage rates, variations in price expectations also play an important role. Here we use past price variations as a proxy for these expectations.

Details of the econometric estimation are presented in Box 3. **Overall, it is estimated that house prices were nearly 30% overvalued in 2006, the height of the bubble.**

## 2. The bubble was caused by easier lending conditions, a durably accommodative monetary policy, and excessive expectations of rising prices

Several factors drove rising demand for housing between the end of the 1990s and 2006. At the same time, supply was virtually incapable of adjusting to demand in urban areas, or was too slow in doing so in rural ones.

### 2.1 Several factors accounted for the easing of mortgage lending terms

From 1992 onwards, US governments progressively relaxed their regulation of mortgage lending in order to encourage home ownership<sup>5</sup> (indeed the proportion of homeowners rose sharply between 1995 and 2005, see Chart 6).

Chart 5: average size of new mortgage loans granted

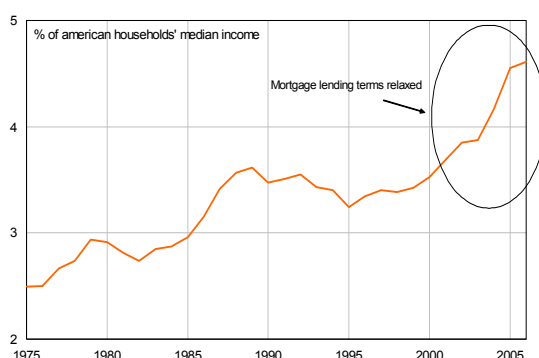
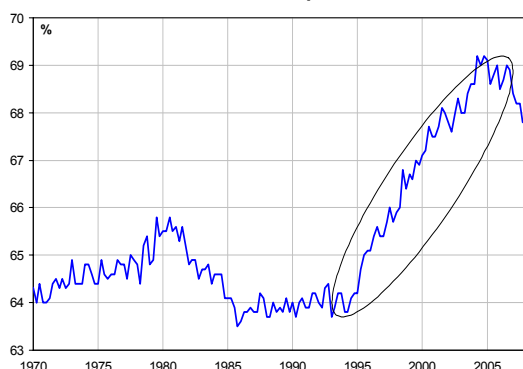


Chart 6: homeownership rates in the United States



Source: Federal Housing Finance Board, BEA.

Moreover, the development of atypical mortgage loans has allowed lenders to extend "attractive" loans (at least at first sight) to households offering slender financial guarantees.

Finally, recourse to securitisation has enabled lenders to lay off at least part of the risks associated with these loans.

### 2.2 Price rise expectations also fuelled the supply of credit

Expectations of house price variations play a key role in a market where the majority of actors are private individuals<sup>6</sup>. Indeed, property came to be seen as a safe haven after the stock market crisis of 2001, notably due to the widespread notion that US house prices could not fall (indeed nominal prices had not declined since the Second World War). This was the background to the growing scale of home buying for speculative purposes (according to Morgan Stanley, 15% of purchases in 2004, versus a long-term average of 5%<sup>7</sup>).

Expectations of rising prices encouraged lenders to relax their lending terms, on the assumption that a household could always sell its property if it ran into repayment difficulties.

### 2.3 Monetary policy was particularly accommodative between 2001 and 2005

The Fed sharply lowered its interest rates in response to the recession at the beginning of the 2000s. As a result, the Fed Funds rate dropped from 6.5% at the end of 2000 to 1% in mid-2003. Combined with other factors, monetary policy thus helped hold mortgage rates at a low level.

Moreover, this prolonged period in which monetary policy remained highly accommodative<sup>8</sup> (see Chart 8) created a situation of abundant liquidity available to feed the supply of mortgage lending<sup>9</sup>.

- (5) Cf. "The U.S. Housing Bubble and the Global Financial Crisis: Housing and Housing-Related Finance", *Joint Economic Committee, United States Congress, May 2008*.
- (6) Cf. Case K. et Shiller R. (2003): "Is there a bubble in the housing market?", *Brookings Paper on Economic Activity*.
- (7) R. Berner and M. Marschoun: "Housing bubble metrics", *Morgan Stanley Global Economic Forum, 27 May 2005*.
- (8) Under the Taylor rule presented in Chart 8, the real Taylor rate is defined as the sum of the neutral rate (approximated by potential growth), the output gap (with a 0.5 coefficient) and the deviation of inflation from its 2% target (with a 0.5 coefficient).
- (9) See Greiber C. and Setzer R. (2007): "Money and Housing - Evidence for the Euro Area and the US", *Deutsche Bundesbank Discussion Paper*.

### Box 3: econometric modelling of house prices

#### Long-term relationship

If there were no constraint on the availability of land, house prices would move in the same way as construction costs over the long term. Land scarcity in urban areas complicates the relationship between house prices and construction costs.

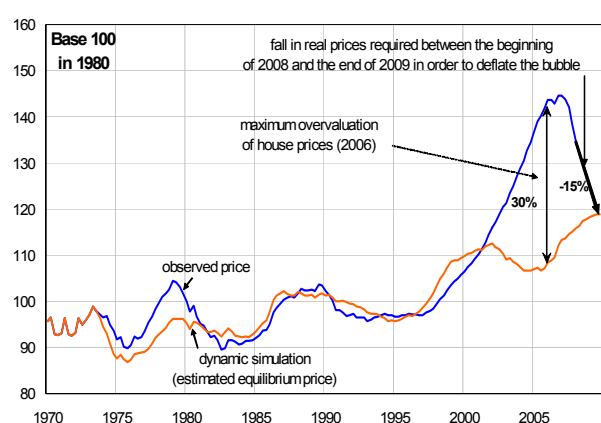
As indicated in 1.4, we have therefore estimated aggregate long-term house prices as a weighting of the price in urban areas (which depends on the determinants of housing demand, i.e. GDI and the mortgage interest rate) and the price in rural areas (which depends on construction costs). The equation that determines aggregate price trends is estimated with the aid of an error correction model, in 2 steps, based on quarterly data for the period 1975-1999. The long-term equation (which gives the "equilibrium price") links the price level to the cost of construction, to real disposable per capita income, and to the real mortgage interest rate. This serves to estimate the relative shares of urban and rural areas in the aggregate price index: the share of the rural areas is estimated at 52%.

**Table 1: estimation and stability of the LT relationship**

| Coefficient                       | Estimation period |         |         |
|-----------------------------------|-------------------|---------|---------|
|                                   | 1975-99           | 1980-99 | 1975-95 |
| Constant                          | -4.19             | -3.86   | -4.42   |
| Real construction costs           | 0.52              | 0.55    | 0.50    |
| Real per capita disposable income | 0.48              | 0.45    | 0.50    |
| Real mortgage rate                | -0.007            | -0.008  | -0.007  |
| R <sup>2</sup>                    | 0.69              | 0.69    | 0.69    |

A KPSS test was carried out to ensure that the residues of the long-term relationship are indeed stationary.

**Chart 7: change in house prices**



Source: OFHEO, DGTPE calculations.

#### Short-term relationship

$$d \ln hp_t = -0.34 - 0.08 \left[ \ln \left( \frac{hp_{t-1}}{cpi_{t-1}} \right) - (1-0.52) \ln(DInc_{t-1}) - 0.52 \ln CC_{t-1} + 0.007 mor_{t-1} \right] \\ + 0.44 d \ln(hp_{t-1}) + 0.43 d \ln(hp_{t-4}) + 0.11 output\_gap_t - 0.005 d(mor_t) + 0.21 d \ln(DInc_t) \\ (-2.62) \quad (-2.64) \quad (c) \quad (-3.85) \quad (2.26) \quad (5.36) \quad (5.40) \quad (2.83) \quad (-4.30) \quad (3.15)$$

Adjusted R<sup>2</sup> = 0.69 ; DW = 1.86

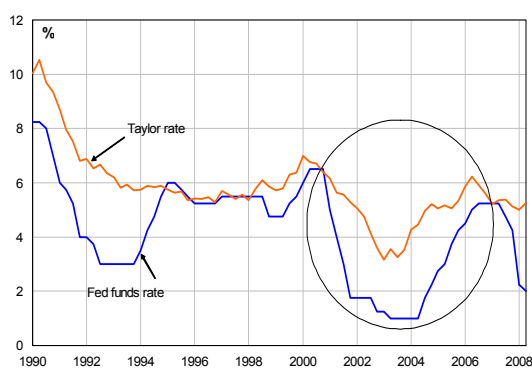
Where:

- *hp* represents the OFHEO house price index
- *DInc* represents real per capita gross disposable income (GDI) of American households (source: BEA)
- *cpi* represents the consumer price index (CPI) (source: BLS)
- *CC* represents real construction costs (source: DGTPE calculations), estimated on the basis of the price of building materials (source: BLS) and hourly wages in the construction industry (source: BLS) appropriately weighted: weighting is carried out the basis of BEA data on the share of intermediate consumption and wages in production. It is assumed that there have been no significant productivity gains in the construction industry since the 1970s, which is what available data on employment and added value in this sector appear to suggest.
- *mor* represents the interest rate on conventional 30-year mortgages (source: FED)
- *real-mor* represents this rate by the annualised rise in the IPC (CPI)
- *output\_gap* represents the gap between actual and potential GDP (output gap) (source: DGTPE calculations)

**Table 2: estimation and stability of the ST relationship**

| Coefficient           | Estimation period |         |         |
|-----------------------|-------------------|---------|---------|
|                       | 1975-99           | 1980-99 | 1975-95 |
| Constant              | -0.34             | -0.18   | -0.40   |
| Error correction term | -0.08             | -0.04   | -0.09   |
| dln( <i>hp</i> (-1))  | 0.44              | 0.33    | 0.44    |
| dln( <i>hp</i> (-4))  | -0.43             | 0.29    | 0.44    |
| <i>output_gap</i>     | 0.11              | 0.08    | 0.12    |
| <i>d(mor)</i>         | -0.005            | -0.004  | -0.005  |
| dln( <i>DInc</i> )    | 0.21              | 0.10    | 0.22    |
| R <sup>2</sup>        | 0.60              | 0.42    | 0.60    |
| DW                    | 1.86              | 2.06    | 1.85    |

**Chart 8: the Fed Funds rate and the Taylor rate**



Source: Federal Reserve, DGTPE calculations.

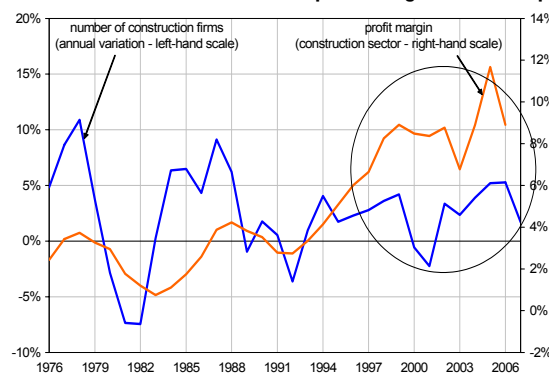
## 2.4 Supply has not adjusted adequately to rising demand

Rising demand for housing in urban areas led directly to increased prices, given the relative inflexibility of supply. In rural areas, where housing supply is more or less unlimited, house prices tend to follow construction costs in the long run. From the middle of the 1990s onwards, however, prices rose faster than these costs. At the same

time, construction firms' profits rose sharply (see Chart 9), relative to both their long-term level and to the rest of the private sector, suggesting that supply had insufficiently adjusted to strong housing demand, thereby allowing margins to widen.

These profits remained at a high level for around a decade, suggesting a certain lack of competition in the industry. Indeed there was no growth in the number of startups in the construction sector over this period.

**Chart 9: construction sector profit margins and startups**



Source: BEA, BLS.

## 3. The return to equilibrium initiated in 2006 could continue until the end of 2009

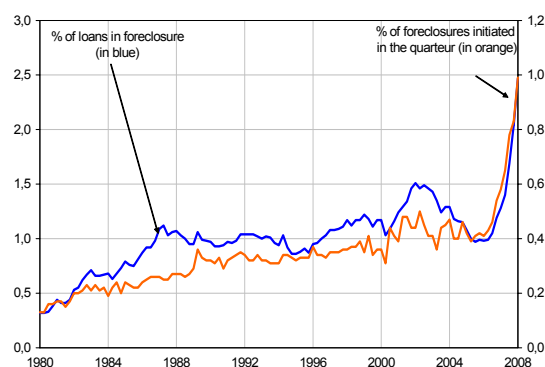
The bubble probably began to burst in mid-2006. With the housing market showing signs of running out of steam, prices slowed sharply before starting to decline from summer 2007 onwards.

### 3.1 For the bubble to deflate entirely between now and the end of 2009, it is estimated that real house prices will have to fall by a further 15% or so between the beginning of 2008 and the end of 2009, or by 10% in nominal terms

As can be seen from the chart on page one, real house prices were still overvalued by 20% at the end of last year despite the downward trend begun in 2007. Given the expected change in equilibrium prices over the period 2008-2009, a return to fundamentals over that time frame implies a further correction of 15% in real terms, representing a fall of around 10% in nominal prices over the same period<sup>10</sup>.

Prices could fall further still, however, dropping beneath their equilibrium level, notably due to the large number of foreclosures<sup>11</sup> (see Chart 10), or again due to the disappearance of a large number of actors from the mortgage market, which is liable to squeeze housing demand over the next few years.

**Chart 10: foreclosures**



Source: M.B.A.

(10) Consumer prices are assumed to rise by 5% between the beginning of 2008 and the end of 2009.

(11) A rise in foreclosures can depress house prices by increasing the supply of homes, especially since the foreclosing institutions are often in a hurry to sell, even at relatively low prices. The existence of a foreclosed home can also depress prices in the neighbourhood.

## Box 4: econometric modelling of the trade-off between buying and renting

In order to model rents we refer to the trade-off households make between buying and renting. This enables us to establish a relationship between house prices and rents, or more precisely between rents and the annual cost of home ownership<sup>a</sup>. For households need to compare this expected annual cost (and not directly the purchase price of the home) with the annual rent, when deciding their trade-off.

This cost of use of the home  $u$  can be calculated as follows<sup>b</sup>:

$$P[\text{rate} + \omega - \tau(\text{rate} + \omega) + \delta - \pi + \gamma] = P \cdot u$$

where

- $P$  is the price of the house;
- $\text{rate}$  is the nominal interest rate on the mortgage loan;
- $\omega$  is the land tax rate;
- $\tau$  is the tax-deductible rate on mortgage loan interest and on the land tax;
- $\delta$  represents the amortisation of the building and the cost of maintenance of the home;
- $\gamma$  is the risk premium associated with the investment in the purchase of a home relative to renting (reduced mobility, for example);
- $\pi$  is the expected annual appreciation in the value of the home.
- $u$  is the cost of use of the home.

The trade-off between ownership and renting assumes that at equilibrium the relationship  $R = P \cdot u$  (where  $R$  is the annual rent) is verified.

Our assumptions are fairly comparable to those proposed by Himmelberg, Mayer and Sinai (2005) for the different parameters thus defined, namely:

$\omega = 1.5\%$ ;  $\tau = 25\%$ ;  $\delta = 2\%$ ;  $\gamma = 1.5\%$ ; for the mortgage rate, we use the conventional mortgage rate published by the Fed; the expected rate of appreciation in house prices is approximated by its moving average growth rate over the past 20 years.

We find that the ratio  $R/P$ , i.e. the relationship between the average annual rents and house prices changes in a manner consistent with the user cost of the home thus defined (see Chart 11 below). In particular, we find that this ratio fell sharply between 1995 and 2005, from nearly 5% to around 3.5%. However, given the change in the cost of use of the home over the period, and in particular the fall in mortgage rates, it does not appear possible to conclude (as some claim<sup>c</sup>) that this decline is synonymous with a market imbalance, or at least an imbalance in households' trade-off between buying and renting.

However, due to the large number of assumptions made in estimating the user cost of the home, these results need to be interpreted with a degree of caution.

The use of this long-term equilibrium derived from the trade-off between buying and renting allows us to model trends in rents, on the assumption that it is house prices that determine rents (which tends to confirm the model of house prices presented in this study).

In the shorter run, variations in rents appear to be negatively correlated with house price variations. This is because the trade-off presented above is not immediate. In addition, in the very short run, in the event of a shock to the home-buying market (for example as a result of a rise in mortgage rates, or a quantitative tightening of mortgage lending), we observe a temporary shift towards renting, which temporarily pushes up rents.

We use an error-correction model in order to model trends in rents. The equation, which is estimated in a single step by means of ordinary least squares over the period Q1 1988-Q4 2006, is as follows:

$$\begin{aligned} d\ln(\text{rent}_t) = & \frac{0.005 - 0.13}{(6.00)(-5.09)} \left( \frac{\text{rent}_{t-1}}{\text{house\_price}_{t-1}} - u_{t-1} \right) - 0.09 d\ln\text{house\_price}_t \\ & + 0.12 d\ln\text{house\_price}_{t-4} + 0.0013 \text{spread}_{t-1} \\ & (3.79) \quad (2.26) \end{aligned}$$

$R^2 = 0.49$  ;  $DW = 1.53$

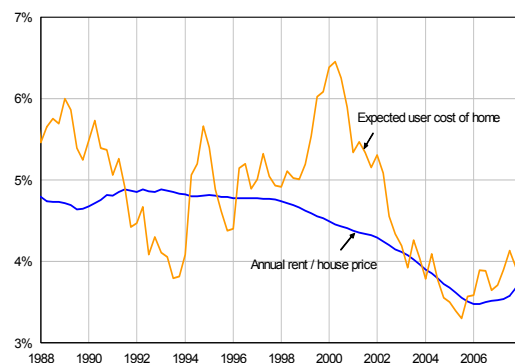
where:

- $\text{rent}$  represent the rent of primary residence component in the consumer price index (source: BLS);
- $\text{house\_price}$  represents the OFHEO house price index;
- $u$  represents the user cost of the home defined above;
- $\text{spread}$  represents the spread between the conventional 30-year mortgage rate (source: FED) and the rate on the 10-year Treasury Bond.

Table 3: stability of estimated coefficients

| Coefficient                     | Estimation period |           |           |
|---------------------------------|-------------------|-----------|-----------|
|                                 | 1988-2006         | 1992-2006 | 1988-2000 |
| Constant                        | 0.005             | 0.005     | 0.005     |
| Error correction term           | -0.13             | -0.06     | -0.04     |
| $d\ln(\text{house\_price})$     | -0.09             | -0.11     | -0.10     |
| $d\ln(\text{house\_price}(-4))$ | 0.12              | 0.11      | 0.11      |
| $\text{spread}$                 | 0.0013            | 0.0011    | 0.0014    |
| $R^2$                           | 0.49              | 0.46      | 0.52      |
| DW                              | 1.53              | 1.40      | 1.76      |

Chart 11: ratio of rents to house prices



Source: OFHEO, DGTPE calculations.

- a. This approach was introduced by Poterba ("Tax Subsidies to Owner-Occupied Housing: An Asset-Market Approach", The Quarterly Journal of Economics, no. 99, Nov. 1984), and was subsequently adopted by Himmelberg, Mayer and Sinai ("Assessing High House Prices: Bubbles, Fundamentals and Misperceptions", Federal Reserve Bank of New York, Sept. 2005), and by L. Eyraud in "Risques inflationnistes aux États-Unis" [Inflationary risks in the United States], *DPAE no. 117*, July 2006.
- b. Here we utilise the formulation developed by Himmelberg, Mayer and Sinai (2005), which is an approximation of Poterba's original formula.
- c. This was notably suggested by M. Davis, A. Lehnert and R. Martin (2007): "The rent-price ratio for the aggregate stock of owner-occupied housing" *REF*.

### 3.2 The price fall is expected to affect activity, reduce inflation, and to have an impact on the financial system

**Concerning activity:** any such decline in house prices would help to depress the construction sector and would also impact household consumption, via the property wealth and mortgage equity withdrawal (MEW) effects<sup>12</sup>. **This could reduce consumption by an estimated 1%, roughly, over two years.**

**Table 4: impact of a 10% permanent house price cut**

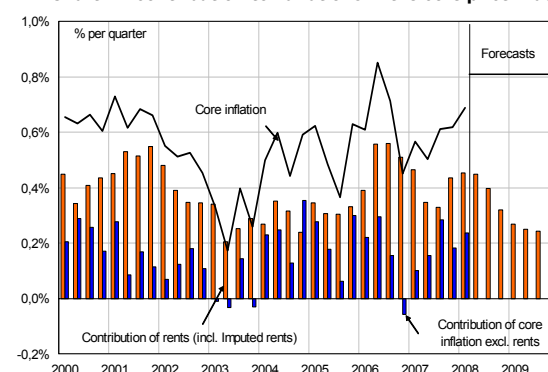
|                        | after  |         |         |         |           |
|------------------------|--------|---------|---------|---------|-----------|
|                        | 1 year | 2 years | 3 years | 4 years | long term |
| on housing assets      | -10%   | -10%    | -10%    | -10%    | -10%      |
| on housing liabilities | -2.5%  | -5.0%   | -7.4%   | -9.8%   | -10%      |
| on housing net wealth  | -17.8% | -15.2%  | -12.6%  | -10.2%  | -10%      |

Source: DGTPE calculations<sup>13</sup>.

the fall in house prices ought to help dampen the rise in rents. By using a model based on households' trade-off between buying and renting (see Box 4), we estimate that the rate of increase in rents could fall from around 4% at the beginning of 2008 to around 2% at the end of 2009.

Since rents account for nearly 50% of the core price index, that would cut core annual inflation by one percentage point.

**Chart 12: contribution to variations in the core price index**



Source: DGTPE calculations.

**Bank balance sheets and the financial system:** falling house prices spell higher mortgage default rates, which is weighing on the value of the assets underlying these loans and hence on financial institutions' balance sheets.

**Stéphane SORBE**

- (12) See Eyraud L., Fortin A. and Rivaud S. (2007): "The impact of the housing slowdown on US consumption", *Trésor-Economics* no. 25, November 2007. Housing wealth accounts for around 20% of total household wealth, and the long-term elasticity of consumption is on the order of 0.2.
- (13) The value of the housing asset varies instantaneously with the variation in price. The mortgage debt is slower to adjust, on the other hand. See notably Greenspan A., Kennedy J. (2005): "Estimates of Home Mortgage Originations, Repayments, and Debt on One-to-Four Family Residences", *Federal Reserve Board*, Sept. 2005.

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