

Are we seeing a bubble on the French housing market?

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Various signs of tension have emerged on the French housing market in recent quarters. In particular, the volume of transactions seems relatively high and stocks are low. In these circumstances, questions have been raised concerning the possible existence of a housing bubble.

Generally speaking, by «speculative bubble» is meant a substantial and persistent gap between the tendency in the price of an asset — in this case, housing — and in that of its funda-

mental determinants. The aim of this special article is to present an assessment of this gap.

For this purpose, two models have been considered:

- The first is based on an equation expressing the trade-off between housing assets and financial assets. In theory, this approach makes it possible to analyse the evolution of the «risk premium» attached to housing assets (i.e. the remuneration of the risk taken by an investor when he chooses to buy a housing asset rather than an asset whose return he knows in advance). The aim is to draw conclusions from the comparison of the level attained by the risk premium at the time of the 1990s bubble with its present level.*
- The second makes reference to a genuine structural model. This makes it possible to evaluate two magnitudes: on the one hand, the gap between the price observed on the housing market and the price related to the evolutions of the demand fundamentals (known as the equilibrium demand price); on the other, the gap between the observed price and the price related to evolutions in the determinants of supply (known as the equilibrium supply price). Using this modelling, which takes a long-term perspective, any substantial gap between the observed price and the equilibrium supply price and/or the equilibrium demand price could be interpreted as proof of the existence of a housing bubble.*

These two approaches do not indicate the existence of a housing bubble at present. However, the results are surrounded by numerous uncertainties, concerning both the data are used and the theoretical and econometric standpoints implied.

The steady rise in the price of existing housing, taking France as a whole (86% between Q3 1996 and Q3 2004, according to the INSEE-Notaires index based on conveyancing information for the whole of France) and especially Paris (see graph 1), as well as the rise in rents (25% in the case of average monthly rents over the same period for the Greater Paris region) have revived questions regarding the existence of a housing bubble.

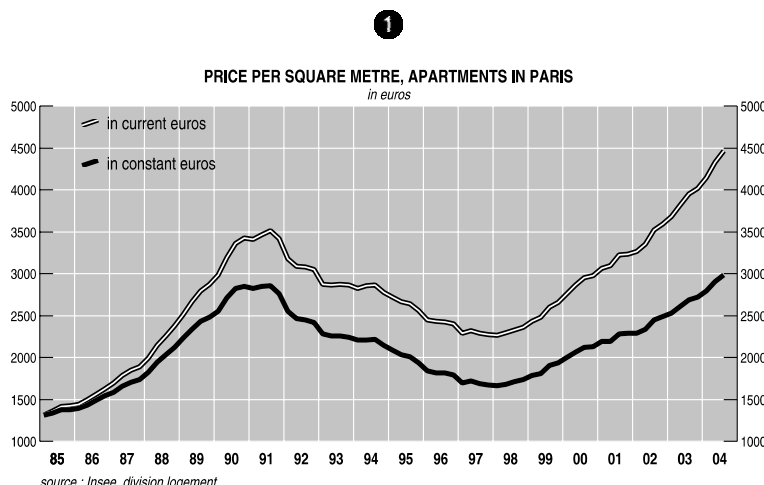
Generally speaking, by «speculative bubble» is meant a substantial and persistent gap between the ten-

dency in the price of an asset - in this case, housing - and in that of its fundamental determinants.

In the French case, the latest studies regarding the possibility of a housing bubble reach relatively prudent conclusions. Admittedly, they stress the signs of tension on the housing market but do not conclude, for the moment at least, that a bubble exists. The approach adopted here is in three stages:

- A preamble provides an analysis of the structural and short-term tendencies that characterise the French housing market;

- Taking this as a starting point, an initial exploratory step, in an attempt to test for the existence of a housing bubble, is to take an equation expressing the trade-off between housing assets and financial assets. In theory, this approach makes it possible to analyse the evolution in the «risk premium» attached to housing assets (i.e. the remuneration of the risk taken by an investor when he chooses to buy a housing asset rather than an asset whose return he knows in advance). The aim is



to draw conclusions from the comparison of the level attained by the risk premium at the time of the 1990s bubble with its present level.

- Still with the aim of testing for the existence of a housing bubble, a second approach has also been adopted. This is based on a structural model⁽¹⁾, making it possible to determine the equilibrium supply and demand prices on the housing market, in order to compare them with observed prices. Taking the definition of the term «bubble» set out earlier, any substantial deviation between the observed prices on the housing market and the equilibrium supply price and/or the equilibrium demand price could then be interpreted as proof of the existence of a housing bubble.

(1) Of the kind used by McCarthy and Peach «Are Home Prices the Next Bubble?», Federal Reserve Bank of New York, Economic Policy Review, December 2004.

(2) Cf. A. Jacquot (2002), « La demande potentielle de logements », INSEE Première n° 875, décembre 2002.

(3) This conclusion can be demonstrated by *reductio ad absurdum*. Let us suppose that it is not the case and that, for example, bonds offer a return lower than that on housing. No one will then have any interest in holding bonds and the bond market will therefore no longer be in equilibrium, which can only be the case if the returns are identical. In this latter configuration, investors will want to hold both types of asset.

Recent tendencies on the housing market are linked both to structural evolutions and to factors of a more immediate nature

The rise in house prices partly reflects a structural imbalance between strong demand and a supply side that is having difficulty in adjusting.

The demand for dwellings, which is principally determined by demographics, is firm. While the population is increasing at an annual rate of 0.5%, the number of households is rising significantly faster (by 1% per year) as a result of population ageing (accounting for 80% of the increase) and, more marginally, of the tendency for couples to live apart. On top of this demographic tendency, confirmed by the first results of the new-style population census, there is the demand for higher-quality accommodation (surface area, number of rooms, equipment, etc.)⁽²⁾.

However, the supply of housing is having difficulty in adjusting to demand, the result being that the market-clearing instrument is the price of existing housing. In reality, the existence in France of a structural housing deficit is well-known and France is no exception in this respect, most European countries being faced with similar difficulties.

These difficulties have led to the introduction of public housing policies whose forms differ from country to country. France has notably introduced a policy aimed at making up for insufficient supply (construction of social housing, tax advantages for investment in rental housing, etc.).

However, alongside these structural determinants, factors of a more immediate nature are contributing to the rise in house prices: the favourable economic situation at the end of the 1990s (in particular, the rise in incomes and in household financial wealth, together with the decline in interest rates) and the easing of financing conditions (maintenance of low interest rates, lengthening of the duration of loans, etc.).

A simple trade-off equation does not appear to confirm the existence of a housing bubble

In order to evaluate the current risks of a housing bubble, the first avenue explored consisted of using an equation expressing the trade-off between housing assets and other assets.

In so doing, we adopt the point of view of a household wondering whether to invest in «bricks and mortar». This household, in making its decision, is called on to compare the return expected on its housing investment with that obtained from other types of investment, such as the purchase of a bond. It is then necessary that the returns on these two types of investment be equal in the eyes of the household⁽³⁾. Bringing the two returns into equality in this way leads to the identification of a non-observed component of the return on housing, called the «risk premium», whose evolution will provide a partial diagnosis of the existence or otherwise of a housing bubble.

It should be pointed out that this approach examines the problem from the angle of the return on assets as traditionally carried out in the case of a financial investment.

This approach calls for certain remarks, however. In the first place, it has to be stressed that for most property-owners living in their own dwelling, the investment involved is not entirely comparable to other types of investment. In particular, the dwelling provides a service and the decision to acquire it will be taken on the basis of other factors as well (geographic location in relation to place of work, the need to vacate an existing dwelling within a given time period, etc.).

Furthermore, housing-related tax relief possibilities (the so-called "Robien", "Besson" and other arrangements) create a distortion in favour of ownership of housing assets. Even if the trade-off relationship is calculated after tax, the pre-tax return on a housing investment can be lower than on a bond investment.

The theoretical equation

To be more specific, suppose that the household in question is prepared to invest p_t euros in period t ⁽⁴⁾:

- If it purchases a bond carrying a rate of interest r_t , it will have $(1 + r_t) p_t$ euros in period $t+1$.
- If it invests in housing, in $t+1$ it will have a sum in euros equal to:
 - first, the price of its asset in $t+1$, denoted by p_{t+1}^* , unknown at date t and evaluated according to a certain expectation mechanism;
 - second, the amount of the rent l_t corresponding to the remuneration of the housing assets during the period;
 - from these two components, however, there has to be deducted an amount proportional to the value of the asset to reflect the depreciation of the dwelling over the period (wear and tear, etc.). This amount is represented by $\delta_t p_t$;

- lastly, account has to be taken of the fact that the housing investment carries a risk, inasmuch as the return on it, in contrast to the return on the bond, is not known in advance. If the household is to have an incentive to purchase a dwelling, it has to be adequately remunerated for the risk it takes. In concrete terms, the housing return must therefore incorporate a «risk premium», denoted by $\zeta_t p_t$.

The trade-off equation between housing assets and alternative forms of investment (bonds) can be written in the traditional manner as follows:

$$(1) (1 + r_t) p_t = p_{t+1}^* + l_t - \delta_t p_t - \zeta_t p_t$$

With :

r_t	Interest rate
p_t	House prices
p_{t+1}^*	Expectation in t of house prices in $t+1$
l_t	Rents
δ_t	Depreciation rate
ζ_t	Risk premium

This equation makes it possible in theory to diagnose the existence of a bubble on the housing market. This is because it permits the identification of a non-observable element in the return on housing, namely the risk premium. When the implicit risk premium is small, this signifies that the risk is inadequately remunerated and hence that a speculative bubble is taking shape. In fact, for any given expectation mechanism, rent and depreciation rate, a small risk premium requires, if the trade-off equation is to hold, a decline in house prices and therefore suggests that there is indeed a discrepancy between the observed price and its fundamental value.

(4) Because of the difficulties met with in taking account of this in practice, no tax-related aspects (in particular, legal fees and capital gains tax) are incorporated in the theoretical reasoning presented here.

Application

By transforming equation (1), the value of the risk premium can be deduced by equation (2):

$$\zeta_t = -r_t + \text{Capital gain}^* + \frac{l_t}{p_t} - \delta_t$$

$$\text{where } \text{Capital gain}^* = \frac{p_{t+1}^* - p_t}{p_t}$$

In reality, equation (2) permits only a partial evaluation of the risk premium, for lack of information regarding certain variables:

First, for lack of data over a sufficiently long period for the whole of France, the indicator of house prices is confined to apartments in Paris, while the indicator of rents concerns the free-market sector, apart from rents that are controlled under the 1948 Act, in greater Paris; the rate of depreciation, for its part, is evaluated for the totality of the housing assets held by French households;

Second, the expected capital gain is based on certain ad hoc assumptions. Two alternatives were tested in order to set bounds on the results obtained. First, a calculation was made using the average growth in house prices over the four latest quarters; second, an arbitrary value of zero was taken. In these circumstances, it is the evolution of ζ_t that can provide interesting discussion rather than its absolute value.

Independently of the hypotheses formulated regarding the formation of price expectations, it then emerges (see graph 2) that:

- During the 1990s, the decline in interest rates and, to a smaller extent, the decline in house prices led to an upturn in the remuneration of the housing risk, which would seem to be consistent with an exit from a bubble;

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Variable	Description	Chosen variable	Source
r_t	Interest rate	10-year rate	Banque de France
p_t	House prices	Price per square metre of apartments in Paris ⁽¹⁾	INSEE Housing Division Index based on conveyancing information
Capital gain*	Expected capital gain	Average growth rate of p , over the 4 latest quarters Alternative assumption : expected capital gain zero	
l_t	Rents	Average rents per square metre	INSEE Housing Division Housing Survey Rents and charges
δ_t	Depreciation rate	Rate of Consumption of Fixed Capital (dwellings and building land owned by households) quarterly basis	INSEE National accounts, capital account

(1) Prices per square metre for the whole of France are not available over sufficiently long period for equation to be applied in case of the 1990s housing bubble.

- During the recent period, the risk premium seems to have been much greater than that seen in the 1990s, which would seem to rule out the existence of a housing bubble. Moreover, the rise in rents has helped to maintain the risk premium at this level and thus limited the risk of formation of a bubble.

An attempted modelling of long-term equilibrium prices on the housing market

The objective here is to exploit a standard structural model making it possible to grasp the essentials of the housing market.

In order to examine the equilibrium on the residential property market, we have attempted to estimate supply and demand equations for the services provided by housing. Because of the limited fluidity of this market and the slow rate of propagation of shocks to prices and to investment in housing, we have concentrated on the long-term relationships. In particular, factors such as pressures on supply — which might have been introduced in the form of the stock of available housing, for example — have not been taken into account in the model, since they operate in the short rather than in the long term.

The model we obtain, although statistically fragile, shows the turnaround that occurred in 1991 (when

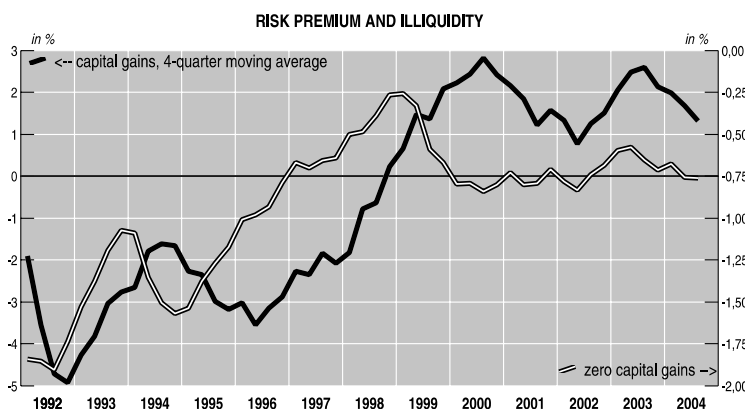
the difference between the market price and the price bringing demand into balance was at a peak) and does not indicate the existence of a housing bubble at the present time (limited gap between the market price and the demand price and absence of overinvestment). However, these results are contingent on the data available, which contain a number of uncertainties.

The underlying theoretical model

The long-term equilibrium model brings into confrontation a demand curve and a supply curve (see box for additional detail).

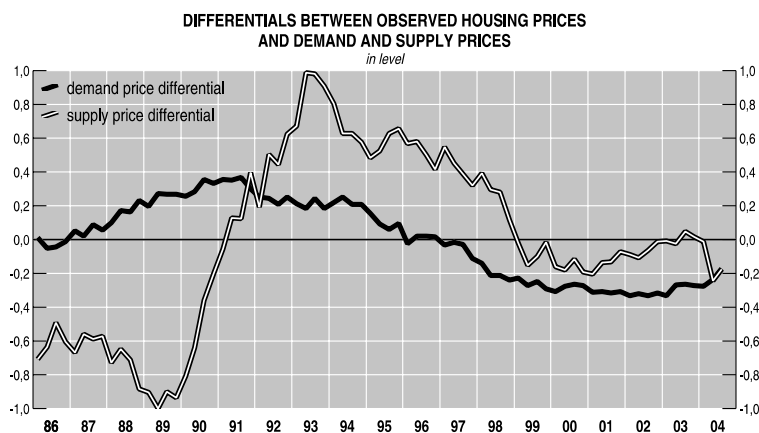
The flows of services provided by housing are a function of the stock of housing. It can even be assumed that they are proportional to this stock. This means that the demand for housing services — and hence the stock of housing capital — are positively related to household income, negatively related to the cost of holding housing assets and, finally, negatively related to the demand price, i.e. the price that brings demand into equilibrium, taking account of the observed values of the other variables⁽⁵⁾.

In order to determine the shape of the supply function, it is postulated that firms in the construction sector maximise their profits. In these circumstances, the investment rate for firms depends negatively on construction costs and positively on the supply price. As in the previous case, this supply price is the price that brings supply into equilibrium, taking into account the observed values of the other variables⁽⁶⁾.



(5) In other words, the demand price is the price the purchaser is prepared to pay, given the quantity on offer. Traditionally, the relationship between this price and demand is negative, since it is scarcity that creates the value of an asset.

(6) The higher the prices, the greater the number of profitable projects for house-builders. The supply price reflects this increasing relationship between prices and investment.



The approach consists of analysing the gaps existing between, on the one hand, the observed price and the theoretical demand price (the residual of the first equation) and, on the other, between the observed price and the theoretical supply price (the residual of the second equation)⁽⁷⁾:

- a large positive residual in the first equation can be interpreted as indicating the existence of a housing bubble, in that the price observed on the market has deviated from its fundamentals;
- a highly negative residual in the second equation will signal overinvestment in the construction sector, with investment higher than the level at which the supply price and the market price are in equilibrium.

Diagnosis of the recent past

The gaps existing between the observed price and the demand price (residual of the first equation) and between the observed price and the supply price (residual of the second equation) are shown in *graph 3*,

(7) The box contains certain considerations regarding the limitations inherent in this approach.

where the zero line represents the average level of these indicators over the period being considered. It can be seen that the gap between the observed price and the demand price widens sharply from 1988 on and peaks just before the market turnaround in 1991, seemingly indicating the existence of a bubble. The gap between observed prices and supply prices bottoms out at the beginning of 1990, when it is well below its average. This phenomenon would seem to reflect the existence of overinvestment in housing, in the sense that investment at this time seems to have been above the level needed to bring the supply price into equilibrium with the market price. This situation then seems to have been sharply reversed during 1990.

Graph 3 shows that over the recent period the gap between observed prices and demand prices seems to have been smaller than its historic average over the period and that the gap between the observed price and the supply price was small. In any case, the situation is considerably different from the distortions seen at the beginning of the 1990s. These results would therefore tend to rule out the assumption of the existence of a housing bubble or of overinvestment in the housing sector at the present time.

Conclusion

The recent period has seen the gradual emergence of tension on the French housing market. In particular, prices have risen strongly, so that households' ability to purchase has deteriorated appreciably and indebtedness has risen substantially.

Even so, the modelling presented here suggests that it would be over-hasty to conclude that a housing bubble exists at the present time. For one thing, the risk premium attached to housing assets seems to be still substantially higher than that seen at the time of the 1990s bubble. For another, house prices do not for the moment seem to be substantially different from the price bringing demand for housing into equilibrium.

These conclusions clearly say nothing about the future evolution of prices on the housing market. They simply highlight certain elements that apparently rule out the existence of a bubble on the French housing market at the present time.

It nevertheless has to be borne in mind that the conclusions of the models are contingent on the data used, which cover a relatively short period of time and for which it is difficult to ensure internal consistency. Moreover, the modelling is based on a certain number of assumptions. In particular, in both the analyses an ad hoc form was adopted regarding households' expectations regarding house prices. It is also worth recalling that in the first model households' purchasing decisions are assumed to be based solely on a comparison of returns and that in the second model econometric problems arise, notably in connection with the brevity of the available series in relation to the methods used and the length of cycles on the housing market (data are available only for a single cycle). ■

BOX: ESTIMATION OF THE STRUCTURAL MODEL

The formulation of the model

- The inverse demand function is used to determine the price p_t^{d*} that enables the demand for housing to adjust to the stock of dwellings. For a given stock of housing capital, the position of this demand function depends on households' permanent income and the cost of capital usage:

$$p_t^{d*} = \alpha_1 h_t + \alpha_2 c_t + \alpha_3 u_t, \text{ with:}$$

Variable ⁽¹⁾	Description	Expected sign
h_t	Stocks of housing capital	Negative
c_t	Permanent income	Positive
u_t	Cost of capital usage	Negative

(1) All the variables shown here are given in log form

- On the assumption that firms in the construction sector maximise their profits, the inverse supply function stipulates that the supply price depends on the investment rate and on construction costs:

$$p_t^{o*} = \gamma_1(f_t - h_t) + \gamma_2 icc_t, \text{ with:}$$

Variable ⁽¹⁾	Description	Expected sign
f_t	Housing investment	Positive
icc_t	Construction cost index	Positive

(1) All the variables shown here are given in log form

The data chosen

- Variable p_t corresponds to the price per square metre of housing in Paris. It is not corrected for quality effects and therefore automatically tends to increase over time as a result of the improvement in comfort.
- Variable h_t corresponds to the volume of the stock of capital in the form of housing and building land held by households, as shown in the capital account of the national accounts. Taking as a starting point the annual series obtained, a quarterly series is constructed with the help of the rate of downgrading of housing capital and the series for households' housing investment. These data cover the whole of France, therefore.
- Variable c_t is approximated by taking consumption of non-durable goods and services. It was reconstituted on the basis of the quarterly national accounts. According to the permanent income theory, households consume in each period a constant fraction of what they estimate to be their permanent income in this period. Consumption is then proportional to permanent income. However, it can be considered that the consumption of durable goods bears a closer relationship to an investment decision than to a consumption decision. Consumption of non-durables and services would then give a better approximation, allowing for a scale factor, of permanent income.

- The cost of capital usage u_t represents the cost of holding a dwelling, allowing for taxation, the expected valuation of the asset and its depreciation:

$$u_t = p_t[(1 - \tau_t^y)(r_t - \tau_t^p) + \delta_t - E(\pi_{t+1}^*)], \text{ with:}$$

Variable	Description	Variable chosen	Source
p_t	House prices in real terms	Price per square metre of apartments in Paris, deflated by the household consumption deflator	INSEE Housing Division Index based on conveyancing information, Quarterly accounts
τ_t^y	Taxation rate	Average apparent rate of personnel income tax and CSG (social contribution) (taxes recovered as proportion of tax base)	Quarterly accounts
r_t	Interest rate	10-year interest rate	Banque de France
τ_t^p	Rate of property tax	n.a.	
δ_t	Depreciation rate	Rate of consumption of fixed capital (dwellings and building land owned by households) quarterly basis	INSEE National accounts, capital account
$E(\pi_{t+1}^*)$	Expected capital gains	Average growth rate of p_t over the latest 4 quarters	INSEE Housing Division Index based on conveyancing information

In the calculation, therefore, house prices do not reflect the situation prevailing in the whole of France, but only for Paris. The influence of the rate of taxation on housing assets had to be partly ignored for lack of information. Finally, the evaluation of the expected capital gain is the subject of a conventional hypothesis identical to that adopted in the trade-off equation (moving average of the price rise over the latest four quarters). All things considered, the evaluation of the cost of capital usage has to be treated with particular caution.

- f_t corresponds to households' housing investment as reported in the quarterly national accounts.
- Finally, icc_t corresponds to the construction cost index published by INSEE and the Ministère de l'Équipement.

It therefore has to be noted that these data have two limitations: first, some of them have required a substantial degree of approximation; second, coverage may differ from one variable to another.

BOX: ESTIMATION OF THE STRUCTURAL MODEL

The estimation obtained

The modelling adopted assumes the existence of two long-term relationships (co-integration relationships) among the following variables: house prices, stocks of housing and building land, consumption of non-durable goods and services, opportunity cost of holding housing, housing investment and construction costs⁽¹⁾.

In order to identify the supply and demand equations, we have imposed the following restrictions⁽²⁾:

- From the demand equation, housing investment and construction costs have been excluded;
- From the supply equation, permanent income and the cost of capital usage have been excluded. In addition, the rate of housing investment is regarded as the relevant variable, meaning that the coefficients of investment and of the stock of capital are constrained to equality.

	Stocks of housing capital	Consumption of non-durables	Cost of capital usage	Housing investment	Construction cost index
Demand	-3,57 (0,70)	8,26 (0,86)	0,07 (0,02)	-	-
Supply	-8,01 (0,78)	-	-	8,01 (0,78)	4,20 (0,50)

(1) Over the period used for the estimation (1986-2004), the Trace test identifies 4 cointegration relationships. However, with economic theory suggesting 2 and since these tests are fragile, we have imposed the condition that the cointegration space is of dimension 2 only.

(2) The chi-squared test leads to the rejection of the overidentification hypothesis at the 12% threshold. However, this result is somewhat fragile (in particular, it is sensitive to the calculation of the cost of capital usage).

The results of the estimation are presented in the following table (standard deviations shown in brackets), in which the dependent variable is the price of housing:

The coefficients are all significant and all carry the expected sign. However, given the method employed and the small number of readings available, these estimates are not statistically very robust.

The various limitations of the model

The results shown here have to be treated with caution, as a result of the various limitations inherent in the model and in the estimation.

- The approach proposed here consists of exploiting the residuals of the estimated equations. This residual-based approach always involves the risk of capturing more than the analysis was intended to provide. For example, if the model is badly specified, the residual will contain not only the gap between the observed price and the equilibrium price, but also the influence on the equilibrium price of the omitted variable or variables.
- The approximations carried out on the data come on top of those implicit in the modelling.
- Finally, the estimates present the econometric difficulties referred to earlier. ■

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