

# Rising House Prices and Monetary Policy

ANNE SIBERT

24 August 2005

ABSTRACT. It is argued that the recent rise in house prices is the biggest financial asset price boom in history. In this note, I look at how house prices are determined and how house price bubbles can occur. I discuss whether the recent increase in house prices is a bubble, whether monetary policy can cause a rise in the price of houses relative to other goods and what central banks should do in response to house price bubbles. Finally, I consider how central banks should take account of house prices in the price index used by central banks to measure inflation.

According to the *Economist*, the rise in housing prices in developed countries in the last five years is the biggest bubble in history, with the total value of residential properties increasing by more than \$30 trillion: an amount roughly equal to developed countries combined annual GDPs.<sup>1</sup> This compares with the global stockmarket boom of the late 1990s where the five-year increase was equal to about 80 percent of annual GDP.<sup>2</sup>

## 1. HOW ARE HOUSE PRICES DETERMINED?

Before proceeding with an analysis of the relationship between monetary policy and the house price boom, it is useful to consider how house prices are determined and how a house price bubble might arise. To keep matters simple, I abstract from uncertainty, depreciation and transactions costs.

Consider a household deciding whether to rent or to buy a house in period  $t$ . If the household rents the house it pays the time- $t$  rent, denoted by  $Q(t)$ . If it purchases the house it pays the time- $t$  house price, denoted by  $P_h(t)$ . If it opted to purchase, rather than rent, then at the start of period  $t + 1$  the household owns a house worth  $P_h(t + 1)$ . The value to the household in period  $t$  of an amount  $P_h(t + 1)$  received in period  $t + 1$  is  $P_h(t + 1) / [1 + i(t, t + 1)]$ , where  $i(t, t + 1)$  is the nominal (after-tax) interest rate between period  $t$  and period  $t + 1$ . For the household to be indifferent between renting and buying, the time- $t$  rent must equal the time- $t$  house price minus the time- $t$  value of the time- $t + 1$  house price. Thus

$$Q(t) = P_h(t) - \frac{P_h(t + 1)}{1 + i(t, t + 1)}. \quad (1)$$

As a housing boom is a situation where house prices are rising relative to other prices in the economy, we are not interested in the absolute level of the house price,  $P_h(t)$ , but rather the house price relative to the consumer price index. Thus, let  $q(t)$  and  $p_h(t)$  be the time- $t$  rent and the time- $t$  house price divided by the consumer price index, respectively. Using this notation, equation (1) can be written as

$$q(t) = p_h(t) - \frac{p_h(t + 1)}{1 + r(t, t + 1)}, \quad (2)$$

---

<sup>1</sup>Briefing paper written for the Committee on Economic and Monetary Affairs (ECON) of the European Parliament for the September 2005 dialogue with the ECB.

<sup>2</sup>"In Come the Waves," *Economist*, 16 Jun 2005.

where  $r(t, t + 1)$  is the real (after-tax) interest rate between period  $t$  and period  $t + 1$ .<sup>3</sup>

The above theory, embodied in equation (2), does not give us the level of the relative house price, it only tells us how this price changes over time: we can find the time- $t + 1$  relative house price as a function of the interest rate and the rent if we know the time- $t$  relative house price. There may be an infinite number of house price paths that are consistent with the above equation. However, it can be shown that only one of these house price paths depends solely on interest rates and rents. This path is the *fundamental* solution and its algebraic expression says that the time- $t$  (relative) house price equals the time- $t$  (relative) rent plus the present discounted value of the stream of all future rents, where the discounting is done using the real interest rates.

## 2. HOUSE PRICE BUBBLES

All of the other non-fundamental solutions to equation (2) are known as *bubble* solutions. In these rational bubbles, the (relative) house price is a function of time as well as the fundamentals (the real rents, real interest rates and – in a more general model – variables such as depreciation, transactions costs, maintenance expenses and factors determining a risk premium). In a bubble, the relative house price rises over time solely because it is expected to rise and, in equilibrium, this belief is self fulfilling.

More generally, bubbles might be thought of as increases in prices that cannot be explained solely by changes in past, current and expected future fundamentals. Another example of how they might arise is a situation, known as a *sunspot*, where market participants believe that prices depend on (serially correlated) variables that ought to be extraneous. The sunspot equilibrium can be consistent with rational expectations when these beliefs are self fulfilling. Bubbles can also arise as *information cascades* when there is imperfect information and, because the market does not aggregate private information perfectly, too much weight is put on a subset of market participants' information.<sup>4</sup>

Opinion is mixed on whether the recent relative house price rise is a bubble. Apparent financial asset price bubbles might actually be the result of non-stationary fundamentals or a non-linear adjustment process associated with nominal rigidities. Testing for bubbles is difficult. An econometrician must first specify a model. If financial asset prices are not explained by the model, the econometrician might claim that their rise is a bubble. But, it might just be that the model is not correctly specified. Hamilton and Whiteman (1985) show that even small persistent undetected movements in fundamentals can lead to huge approximation errors. Thus, even when prices appear to be way out of line with the fundamentals or when the fundamentals (such as risk premia) are hard to observe, it is not possible to verify whether or not a bubble exists.

Perhaps the most convincing argument that the current house price rise is a bubble is the relationship between current house prices and current rents. As argued above, in the absence of uncertainty, if there is no bubble then the current house price ought to equal the present discounted value of the current and all future rents. Future rents and interest rates are unobservable, but one can calculate the ratio of current house prices to current rents and compare this with historical data. Using this measure, US house prices are out of line by 35 percent compared with data from 1975 - 2000; in Britain and Spain they are out of line by over 50 percent.<sup>5</sup> These numbers are an overstatement, however,

<sup>3</sup>Using the Fisher equation, the nominal interest rate equals the real interest rate multiplied by one plus the inflation rate:  $i(t, t + 1) = r(t, t + 1)P(t + 1)/P(t)$ , where  $P(t)$  is the time- $t$  price index.

<sup>4</sup>See, for example, Lee (1998).

<sup>5</sup>"In Come the Waves," *Economist*, 16 Jun 2005.

if fundamental factors – such as building restrictions – imply that rents are expected to rise more sharply over time than they were in the past.

### 3. CAN MONETARY POLICY CAUSE A HOUSING BOOM?

In the short run, nominal rigidities imply that monetary policy can affect the price of houses, relative to other prices. This is because the central bank sets short-term nominal interest rates and with nominal rigidities this can affect the short-term real interest rate. For example, suppose that a central bank raised its short-term nominal interest rate. In the short run, the real interest rate might rise. Thus, the present discounted value of the stream of future rents would rise and the current house price would rise relative to the price of other goods in the economy. This rise would be temporary however. In the long run, monetary policy cannot effect real variables, including the real interest rate.

In the long run, if everything else besides monetary policy remains constant, rent and house prices (variables  $Q(t)$  and  $P_h(t)$  in equation (1), respectively) will rise at the same rate as other nominal prices in the economy.<sup>6</sup> The house price, relative to the price of other goods, (equation  $p_h(t)$  in equation (2)) remains constant: in the long-run, monetary policy cannot cause a housing boom. As a consequence, it is not plausible that the current stance of monetary policy is responsible for the recent rise in house prices.

### 4. IF THE HOUSE PRICE RISE IS A BUBBLE, WHAT IS THE RISK OF IT BURSTING?

If current house prices (relative to the prices of other goods) are too high to be justified by the present discounted value of the stream of current and future rents (relative to the prices of other goods), then either current relative house prices must fall, current and future relative rents must rise or real after-tax interest rates must fall. If the scope for after-tax interest rates to fall is limited and rents are not expected to rise sharply over time, then most of the adjustment will be borne by house prices.

Unlike equity prices, however, house prices are not likely to plummet. As it is costly for homeowners to move, house prices are apt to be "sticky" relative to the price of other financial assets. If the current house price rise is a bubble, the likely scenario is a slow decline in prices, followed by a long period of house-price stagnation.

### 5. WHAT SHOULD CENTRAL BANKS DO?

If the current house price boom is not a bubble, central banks can and should do nothing. As previously noted, central banks cannot systematically control real variables such as relative prices. Nor should they want to: relative price changes are the mechanism that ensures that a competitive economy allocates resources correctly.<sup>7</sup>

If the current house price is a bubble, then containing it – if this is possible – may be desirable for two reasons. First, because prices reflect factors other than the fundamentals, resources are allocated incorrectly. Second, bubbles may eventually burst and when they do this can lead to substantial output loss. Asset price collapses not only redistribute wealth, the associated restructurings and bankruptcies eat up real resources. Other asset price booms, such as equity and land price booms, that have occurred throughout Europe, Asia and Latin America since the 1980s were frequently followed by financial crises and

<sup>6</sup>Suppose that monetary policy leads to inflation of  $x(t-1, t)$  percent between period  $t-1$  and year  $t$  and real interest rate is constant at  $r$ . Then a fundamental solution to equation (1) has  $(1+r)Q(t) = rP_h(t)$  for every  $t$ ; hence, the house price, as well as the rental price of houses, rises at the inflation rate.

<sup>7</sup>If rental prices are distorted, removing the distortions may be desirable, but is not a task for the central bank.

sharp economic contractions. House price collapses have typically had longer and worse repercussions than other asset price collapses.

As a consequence of these costs, some people – such as Cecchetti, Genberg and Wadhvani (2002) – have argued that central banks ought to react to asset price misalignments, raising interest rates when asset prices are above levels justified by the fundamentals and lowering interest rates when asset prices are too low. However, even if central banks were sure that the current housing boom were a bubble, could they pop it? It seems unlikely that monetary policy would be effective as – by definition – bubbles are *deviations* from equilibria supported by fundamentals such as monetary policy. Using monetary policy to attempt to prick a bubble is not without risk and central banks have not demonstrated an aptitude for this task; a cautionary example is provided by the Bank of Japan's attempt in late 1989 to burst Japan's property and equity bubble by tightening monetary policy.

#### 6. HOW SHOULD HOUSE PRICES ENTER THE CONSUMER PRICE INDEX?

A problem for central banks that has been made more pressing by the house price rise is how house prices should be treated in the price index targeted by the central bank. Ideally, price indices used by central banks should be a measure of the purchasing power of money over current consumption only.<sup>8</sup> Perhaps the best way to measure the price of a household's current housing consumption is to ask what it would cost to rent their house.

If we take account of uncertainty, then equation (1) can be written as:

$$Q(t) = P_h(t) - \frac{E_t[P_h(t+1)]}{1+i(t,t+1)} + RP(t), \quad (3)$$

where  $E_t[P_h(t+1)]$  is the expected, or forecasted, value of the house price at time  $t+1$ , under information available at time  $t$  and  $RP(t)$  is a time- $t$  risk premium.

Unfortunately, using equation (3) to calculate the rental price is difficult as neither the expected time  $t+1$  house price nor the risk premium are observable. Succumbing to the temptation of ignoring the risk premium and using actual time- $t+1$  house prices yields the perverse result that measured rents can be negative in times of house-price inflation.

The solution for the euro area might be to try to use actual rental prices: this is the method used in the United States. This would present challenges, however. The nature of the renter-occupied housing market varies across countries; it may be distorted, small or dissimilar to the owner-occupied housing market.

#### REFERENCES

- [1] Hamilton, James D. and Charles H. Whiteman (1985), "The Observational Implications of Self-Fulfilling Expectations," *Journal of Monetary Economics* 16, 353-373.
- [2] Lee, In Ho (1998), "Market Crashes and Informational Avalanches," *Review of Economic Studies* 65, 741-759.
- [3] Cecchetti, Stephen, Hans Genberg and Sushil Wadhvani (2002), "Asset Prices in a Flexible Inflation Targeting Framework," NBER Working Paper 8970.

---

<sup>8</sup>Including future consumption, as some economists have proposed, implies implicitly including the real interest rate. As argued, central banks cannot affect the real interest rate in the long run.