

KEYNES LECTURE IN ECONOMICS

# Practical Issues in United Kingdom Monetary Policy, 2000–2005

STEPHEN NICKELL

*Fellow of the Academy*

## 1. Introduction

FOR THE KEYNES LECTURE, a discussion of the practicalities of UK macroeconomic policy seems particularly apposite. This lecture deals with some of the topics on which the Bank of England Monetary Policy Committee (MPC) has spent a lot of time since I became a member in June 2000. Interestingly enough, these topics would typically not occupy much space in a text book on monetary economics. The three topics on which I shall focus are as follows: first, the rapid rise in household debt and its implications for monetary policy; second, the role of asset prices in monetary policy with particular reference to the recent UK housing boom; third, the implications of the switch in the inflation target at the end of 2003.

Before moving on to the details, it is worth briefly noting how the MPC operates in the UK. We have a specific inflation target set by the Chancellor of the Exchequer which we are required to meet at all times. The target is symmetric in the sense that being below target is just as bad as being above target. To hit the inflation target we focus on a period between twelve months and thirty months into the future. We generate an MPC forecast every three months, conditioned by market expectations of the Bank of England's official interest rate (the market curve). If this produces forecasts such that inflation has a relatively high probability of

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moving significantly above (below) target, we tend at some stage to raise (lower) rates above (below) those implied by the market curve.

The interest rate decision is produced monthly and is based on majority voting within the MPC, with the *Minutes* providing an explanation and details of individual votes thirteen days after the decision. We also publish the forecast every three months with detailed explanation in the *Inflation Report*.

Members of the MPC are individually responsible for their own decisions and have to be prepared to justify their voting record under public questioning from the House of Commons Treasury Select Committee. Members of the MPC are also expected to explain their own thinking in various national and regional fora on a regular basis.

This procedure for setting interest rates in the UK differs from the rules for good monetary policy making set out in Svensson (1999), although not dramatically. In particular, the MPC forecast is not conditioned on estimates of its own optimal future interest rate path but instead on estimates of the market expectations of the Bank's future interest rate path. However, the MPC operates in an open and transparent fashion which is probably more important than not following fully optimal procedures.

## 2. Household debt and consumption

I joined the MPC in June 2000, and almost from that moment it is clear, in retrospect, that the UK economy started gradually to slow. But while the US and the German economies were contracting for most of 2001, the UK economy did not contract for a single quarter and the UK unemployment rate was the same at the end of 2001 as it was at the end of 2000. UK monetary policy was significantly relaxed during 2001 and so, despite falling investment and a weakening world economy, domestic demand continued to expand steadily so that overall growth rates remained positive. Some commentators, however, argue that the relative stability of UK GDP growth during the course of a significant recession in the world's major economies (US, Germany, Japan) was only achieved at some cost. For example, Fred Harrison notes that 'Encouraged by low interest rates, people went on a spending spree. They reduced savings and extracted equity from their homes to fuel a consumption boom' (*The Observer*, 27 March 2005). Again looking back, Hamish McRae in *The Independent* in early 2005 (16 March) states that, 'What is, however, clear

is that the credit-fuelled spending boom is, one way or another, coming to an end’.

The common themes are clear, booming consumption and rapidly expanding debt. Indeed, for years the rising debt to income ratio in the UK has caused significant concern. Philip Thornton’s remarks in mid-2003 are typical; ‘Britons piled on an all-time record amount of debt last month, triggering fears that consumers have embarked on an unsustainable borrowing binge that will end in a crash reminiscent of the early 1990s’ (*The Independent*, 30 July 2003).

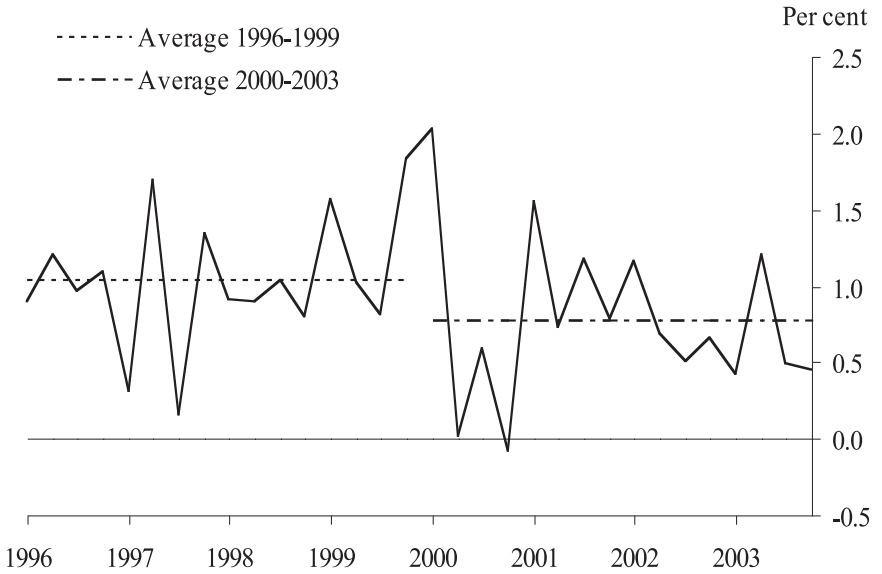
These arguments are commonplace. Indeed they have probably developed into the received wisdom about the first few years of the twenty-first century, namely, that UK macroeconomic policy enabled the UK economy to miss out on recession by generating a house price bubble and an associated credit-fuelled spending boom. In what follows we shall, among other things, argue that there has not been a spending boom, the non-spending boom was not credit-fuelled and there has probably not been a house price bubble. In this section, we focus on the first two of these leaving our analysis of house prices to the next section.

### **The non-existent household spending boom of 2000–3**

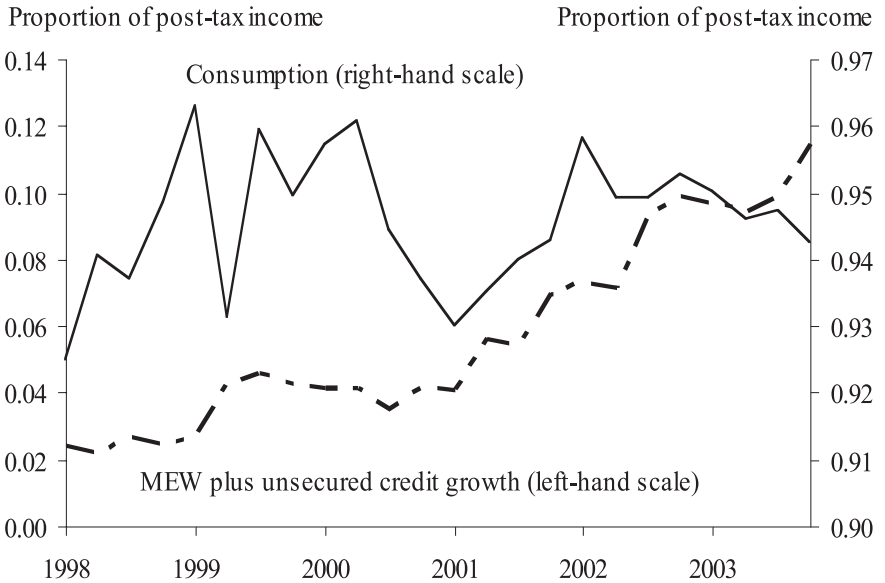
In Figure 1, we show quarterly consumption growth in the UK from 1996 to the end of 2003. Over the period of the supposed consumption boom in 2000–3, we see that average quarterly consumption growth was 0.77 per cent,<sup>1</sup> very close to the average over the last twenty-five years (0.72 per cent) and well *below* average consumption growth in the previous period (1996–9) which was 1.03 per cent. Furthermore, as we can see from Figure 2, from 1998 to the end of 2003, the proportion of post-tax income that was consumed was relatively flat, hardly evidence of a debt fuelled consumption boom.<sup>2</sup> Nevertheless, as we can also see in Figure 2, mortgage equity withdrawal (MEW) plus unsecured credit growth rose from around two per cent of post-tax household income in 1998 to over ten per cent in 2003. So there was indeed a significant rise in the rate of household debt accumulation from 1998 to 2003 despite the fact that the ratio

<sup>1</sup> As it happens, average quarterly consumption growth from 2004, Q1 to the present (i.e. 2005 Q1) is also 0.77 per cent.

<sup>2</sup> The period 1996–7 was the era of building society demutualisations when households received substantial windfall gains. These may have had an impact on consumption growth in the late 1990s.



**Figure 1.** Quarterly consumption growth 1996–2003. (Source: ONS.)



**Figure 2.** Consumption and debt 1998–2003. (Sources: Bank of England and ONS.)

of consumption to post-tax income remained stable throughout. So what was going on?

### **The relationship between consumption, debt and post-tax income**

First, let us look at the mechanical relationship between the consumption, post-tax income and debt of households. The basic identity is

$$\begin{aligned} \text{Consumption} \equiv & \text{Post Tax Income} \\ & - \text{Net Acquisition of Financial Assets} \\ & - \text{Net Acquisition of Housing Assets} \\ & + \text{Net Acquisition of Financial Liabilities.}^3 \end{aligned}$$

This simply says that in aggregate, post-tax income plus new debt can be spent either on consumption or on houses or on financial assets. So where does MEW come into the story? First, financial liabilities can be divided into secured and unsecured. Then MEW is defined by

$$\begin{aligned} \text{MEW} = & \text{Net Acquisition of Secured Financial Liabilities} \\ & - \text{Net Acquisition of Housing Assets.} \end{aligned}$$

So if we add the net increase in unsecured debt to MEW, we get the net acquisition of financial liabilities less the net acquisition of housing assets. This is sometimes known as lending ‘available’ for consumption. But as Figure 2 has shown, while it may be available for consumption, it is not necessarily used for this purpose because some of it goes towards an increase in the rate of acquisition of financial assets.

Let us look at the facts. First, rewrite the basic identity as

$$\begin{aligned} \frac{\text{Consumption}}{\text{PT Income}} = & 1 - \frac{\text{NA Financial Assets}}{\text{PT Income}} - \frac{\text{NA Housing Assets}}{\text{PT Income}} \\ & + \frac{\text{NA Financial Liabilities}}{\text{PT Income}} \end{aligned}$$

(NA = Net Acquisition, PT = Post-Tax)

So to understand how consumption changes relative to post-tax income, we need to look at the net acquisition of financial assets, housing

<sup>3</sup> These are money flows. This equation takes no account of the changes in value of the existing stock of assets which are very important in determining changes in the balance sheet position of households.

assets and financial liabilities, all relative to post-tax income. In Table 1, we see that the net acquisition of housing assets has risen gradually relative to post-tax income since the early 1990s. This term consists basically of the purchase of newly built houses and the money spent on home improvements. Houses purchased by one household from another household cancel out and so make no contribution. The net acquisition of financial liabilities, which simply refers to the accumulation of household debt, increased gradually during the mid-1990s but more than doubled from 1998 to 2003. Interestingly enough, the rate at which households accumulated financial assets increased rapidly from exactly the same date, also more than doubling from 1998 to 2003. In a mechanical sense, this is why consumption has not risen as a share of household post-tax income over this period. During this period, when the rate of household debt accumulation has been rising rapidly, the rate of household financial asset accumulation has also been rising rapidly. So is this just a happy accident, or are there reasons why the accumulation of debt and assets might be related? The first point to note is that it seems unlikely that the households which are accumulating this extra debt are the same households which are accumulating the extra financial assets. Indeed, we know that most of the new debt is secured on houses (see the last two columns in Table 1), so a good part of it will be associated with the accumulation of housing assets by individual households. In aggregate, on the other hand, this is not the case because most house purchases simply involve one

**Table 1.** Accumulation of household debt and assets.

	NA of financial assets/PT income (%)	NA of housing assets/PT income (%)	NA of financial liabilities/PT income (%)		
			Total	Unsecured	Secured
1993	8.9	4.9	3.8	0.6	3.2
1994	10.2	5.3	5.3	1.2	4.1
1995	11.9	5.4	5.7	1.6	4.1
1996	11.2	5.6	5.9	2.1	3.8
1997	12.2	5.7	7.0	2.1	4.9
1998	7.3	5.8	7.9	2.4	5.5
1999	9.3	6.1	10.4	2.4	8.1
2000	8.5	5.9	9.9	2.2	7.8
2001	11.6	6.2	11.6	2.5	9.1
2002	14.9	6.8	16.6	2.9	13.7
2003	15.7	7.2	17.4	2.6	14.8
2004	15.2	7.8	17.1	2.9	14.2
2005 Q1	14.6	7.9	15.7	2.9	12.8

Source: ONS

household buying a house from another household, with little net accumulation of housing assets in aggregate.

So any possible systematic connection between debt accumulation and financial asset accumulation will typically involve more than one household. An obvious example is when a household takes out a substantial mortgage to purchase a house from a last-time seller who has no mortgage and is either moving into rented accommodation (e.g. an old peoples' home) or has received the property as an inheritance. In either case it is entirely plausible that the seller will invest the money from the sale of the property in financial assets and we see a direct correspondence between the increase in household debt generated by the buyer and the accumulation of financial assets by the seller. Furthermore, as house prices rise, we can expect both debt accumulation and financial asset accumulation to be bigger in each transaction of this type.

So it is clear from this example that some housing transactions will generate both net increases in debt and net increases in asset accumulation. Interestingly enough this example involves mortgage equity withdrawal because there has been an increase in aggregate secured debt and no aggregate housing investment. So here we have an example of mortgage equity withdrawal which does not involve additional consumption. Of course, there are other housing transactions which lead directly to both mortgage equity withdrawal and increased consumption. The obvious example is where households simply borrow more by raising the mortgage on their existing property. But it is important to recognise that the majority of mortgage equity withdrawal is not of this type and leads not to increased consumption but to increased financial asset accumulation (see Benito and Power, 2004 for more detail). That is why the rates of accumulation of financial liabilities and of financial assets have risen together, leaving the proportion of post-tax household income which is consumed remarkably stable in recent years (note that the savings rate in 1998–9 was 5.6 per cent and in 2003 it was 5.4 per cent).

So to summarise, what we have seen is, first, that the average quarterly growth rate of real consumption over the period 2000–3 has been almost exactly equal to the average growth rate over the last twenty-five years, so there was no consumption boom. Second, from 1998 to 2003 the proportion of their post-tax income which has been consumed by households has been stable, despite the fact that mortgage equity withdrawal plus unsecured credit has grown from two per cent of post-tax income to nearly ten per cent of post-tax income over the same period. Third, these two apparently inconsistent facts are reconciled by the fact that since

1998, the increasing rate of accumulation of debt by households has been closely matched by the increasing rate of accumulation of financial assets. Furthermore, this is not an accident. There are good reasons why aggregate secured debt accumulation and aggregate financial asset accumulation might be related, particularly in a period of rapidly rising house prices. Finally, therefore, there is no strong relationship between aggregate consumption growth and aggregate debt accumulation.<sup>4</sup> In the light of these facts, should the level of household debt have any impact on monetary policy?

### **High levels of debt and monetary policy**

In the MPC minutes of October 2002, the first reason for leaving interest rates unchanged was that

Domestic demand was still quite resilient and the economy was growing close to potential. An interest rate reduction seemed likely at present predominantly to affect house prices, household borrowing and consumption which were already increasing strongly. A further reduction in the repo rate risked creating an unsustainable increase in debt which might subsequently unwind sharply. This would increase the risk of undershooting the inflation target in the medium term.

I did not accept this view and voted for a rate cut. As I noted in Nickell (2003a), ‘Since the most likely outcome was for inflation to undershoot the target throughout 2004, albeit by a small margin, I judged that it was better to institute a small cut in rates rather than hold off for fear of exacerbating problems of uncertain magnitude yet further into the future.’

To pursue the issue of debt and monetary policy further, it is helpful to have some background on household debt in the UK. In 1975, household debt was around 38 per cent of household post-tax income. By 2004, this had risen to around 125 per cent. Currently, over four-fifths of household debt is secured on property, ie. consists of mortgages, and around 95 per cent of *all* household debt is held by mortgagors (see May *et al.*, 2004). The driving force behind the dramatic rise in household debt over the last thirty years has been the continuing rise in the number of owner-occupied dwellings and in the proportion of households with a mortgage. Other factors lying behind the rise in secured debt include the reduction

<sup>4</sup> For those readers who are more persuaded by the paraphernalia of Granger Causality Tests, no debt measure or combination of debt measures come close to Granger causing real consumption once real post-tax labour income is included in the model.



in the ‘front end loading’ of mortgage repayments as inflation and nominal interest rates have fallen, leading to higher loan to income ratios for first-time buyers, as well as the significant increase in house prices relative to incomes in recent years. This latter has led to higher mortgages relative to incomes and will continue to do so as lower ‘old mortgages’ get replaced by higher ‘new mortgages’. This process will go on for many years, unless there is a dramatic fall in house prices, so that debt to income ratios will continue to rise to ever higher levels.

So why should high debt levels impact on monetary policy? The naïve argument that more debt means a bigger increase in debt service costs when interest rates go up and hence a bigger fall in income available for consumption, tells only half the story. Debtor households on one side of the aggregate balance sheet correspond to creditor households on the other. When interest rates rise, the former have less money to spend on consumption and the latter have correspondingly more money. So in order for debt levels to have an impact on aggregate demand as interest rates change, the debtor households must have a higher marginal propensity to spend than the creditor households. The evidence on this is thin. However, there is some evidence that a significant proportion of interest payments made by UK debtors does not end up in the hands of other UK households. So when interest rates rise, aggregate income available for household consumption will indeed decline. Such cash-flow effects suggest that higher *levels* of household debt will make consumption, and hence output and inflation, more sensitive to interest rate changes. This, of course, indicates that higher levels of household debt would reduce the extent of the interest rate adjustments required to hit an inflation target.

Three further arguments have been suggested in support of the view that household debt is a significant factor in the determination of monetary policy. The first concerns the behaviour of the economy in response to shocks if households have high levels of debt. This is, presumably, what the Griffiths Commission had in mind when it remarked, a shade dramatically, that ‘Debt is a time-bomb which could be triggered by any number of shocks to the economy at any time’ (The Griffiths Commission, 2005, Executive Summary). Suppose there is a future adverse shock to the UK economy. This will lead to a rise in UK unemployment and a fall in consumption, whatever the debt levels. The argument is that higher debt levels will make things substantially worse. That is because more people will be in a position where they are unable to extend their borrowing. If they become unemployed, or are threatened with unemployment, they will significantly reduce consumption because

they will be, or will have the prospect of being, unable to service their debts. The first question is, will higher debt levels put substantially more people in this position? In aggregate, there appears to be 'plenty of room'. Secured debt is only around one-quarter of gross housing wealth, a substantially lower level than throughout the 1990s. But the aggregate hides a wide variation across the population and it is the numbers on the margin which count. Comfort may perhaps be taken from the fact that data from the Survey of Mortgage Lenders indicate that loan to value ratios on new mortgages are modest by historical standards and have been trending down for the last decade. Furthermore, there has been a significant demographic shift towards two-earner households over the last two decades and these households have a greater cushion against unemployment.

Another point worth noting is that because one of the key issues in this argument is the cost of debt service, this will be moderated by easing of monetary policy following the adverse shock. Back in the early 1990s this option was unavailable because of the ERM constraint. However, the excessive debt may still induce greater precautionary saving and a larger drop in consumption. Overall, it is hard to tell whether higher debt levels will generate a significant additional cut-back in consumption which cannot be modified by easier monetary policy.

The second argument is based on the possibility that households have underestimated the true real interest rate which they face. So it is sometimes argued that debtors will collectively 'wake-up' to the fact that their debts have not been eroded, and will then take fright and cut their consumption dramatically causing severe macroeconomic problems. Why households, particularly mortgage holders who have the bulk of the debt, should do this is not at all clear. It is true that in the era of high inflation, which ended in 1992, debts were rapidly eroded. But the mortgage holders with the highest debts relative to income, namely the young, have no adult experience of the high inflation era. Furthermore, they are the group with the fastest real earnings growth. So while they might behave in the irrational fashion described above, there seems to be no obvious reason why they should.

The third argument is very simple. More people with mortgages means more trouble if there is a really serious collapse in the housing market. If house prices fall by 30 or 40 per cent, more people with mortgages means more people in negative equity. Of course, the consequences of this depend to some extent on the behaviour of lenders. If the mortgage debt continues to be treated as secured, even though some is not,

then debt service costs remain unchanged. So a lot will then depend on the collateral damage associated with the collapse in the housing market and what caused it in the first place. For example, the house price correction in the late 1980s and early 1990s was basically a consequence of the 15 per cent interest rates required to control inflation. The tight monetary policy also generated a big rise in unemployment and all this together had a big macroeconomic impact. This particular scenario seems unlikely today. But what causes the collapse in house prices is not the main question. The issue is, if some disaster happens in the housing market, does the fact that more people have mortgages make the consequences very much worse? So much worse, indeed, that monetary policy should be used to discourage individuals from taking out mortgages. In my view, this should not be a target of monetary policy.

This leads to the final question, namely, should we ever keep interest rates higher than would be required to hit the inflation target in the medium term in order not to encourage further debt accumulation, because this will add to the risk of sharper falls in consumption generating an even bigger undershoot of the inflation target further out? In the light of all the previous discussion, my judgement would be no.

### 3. Asset prices and monetary policy

The role of asset prices in the conduct of monetary policy remains a controversial issue. The consensus view is set out clearly in Bernanke and Gertler (1999): ‘It is neither necessary nor desirable for monetary policy to respond to changes in asset prices, except to the extent that they help to forecast inflationary or deflationary pressures’ (p. 115). The alternative view is set out in Cecchetti *et al.* (2002): ‘There are sound theoretical reasons for believing that an inflation targeting central bank might improve macroeconomic performance by reacting to asset price misalignments *over and above* the deviation of, say, a two-year ahead inflation forecast from target’ (Summary). Roger Bootle (2004) is in no doubt. ‘Now over-concentration on the last problem—inflation—has encouraged central banks to pay insufficient attention to the new problem before their eyes, namely asset price bubbles’ (p. 8).

Personally, I favour the consensus view for the following reasons. First, as the Cecchetti *et al.* quotation makes clear, asset price misalignments, or bubbles, have to be identified. Since it is often the case that asset prices boom following some improvement in fundamentals, pin-pointing

the extent to which asset prices exceed the level implied by fundamentals is by no means straightforward. Second, raising interest rates simply to restrain an asset price boom may reduce one of the shocks hitting the economy. But this will be at the probable expense of systematically moving inflation further from target which will add extra instability of its own. As Chris Allsopp (2002) notes:

It is hard enough to establish a credible (monetary policy) reaction function based on clear objectives with the interest rate being used to meet the inflation target . . . If the interest rate has another role as well, being used to moderate the shock structure (e.g., by heading off bubbles from time to time), the reaction function is far less rule-like and predictable, and the system is less likely to be transparent and accountable. (p. 18)

A third reason to favour the consensus view remains valid even were misalignments or bubbles to be readily identified. The problem is that the relatively long lags in the monetary transmission mechanism make the appropriate response to asset price misalignments very hard to calibrate. For example, there is a big risk that rates are raised and then the asset price bubble bursts just when the deflationary impact of the rate rise hits the economy. As Gruen *et al.* (2003) demonstrate, even when the nature of the asset price bubble is common knowledge, there is typically only a very narrow window during which action is desirable. Finally, it is quite probable that a large increase in interest rates may be required to have any significant effect on the asset price bubble, and this may have a big adverse impact on the rest of the economy.

So these are the factors underlying my own views on the subject of asset prices and monetary policy, but my own experiences have also helped form these views, so it is to these that I now turn.

### **Asset prices and monetary policy in practice**

When I joined the MPC in June 2000, the asset price which exercised commentators and members of the MPC alike was the sterling exchange rate. Thus, during my confirmation hearings in front of the Treasury Select Committee in May 2000, Edward Davey MP pointed out to me that ‘Mervyn King recently told a press conference that the biggest issue facing the MPC is how to set monetary policy when confronting an unsustainable exchange rate’, although King was, in fact, referring solely to the sterling rate against the euro. Furthermore, the discussion in Wadhvani (2000) made it plain that in his view the current level of the sterling exchange rate represented a significant upward misalignment. As

can be seen in Figure 3, between 1996 and 1997, sterling rose by around 25 per cent. Then between 1998 and 2000, it spent most of the time fluctuating between 98 and 110 (using the index whose value was 100 in 1990). It was the dramatic rise in 1996–7 which led people to refer to unsustainability, misalignment and even bubbles. However, as time passed and sterling remained within the 98/110 band, talk of unsustainability and misalignment died away, so that at the time of writing (Summer 2005), with sterling still within the 98/110 band, misalignment of the trade-weighted UK exchange rate is rarely thought to be a major issue for monetary policy. Indeed, some time in early 2002, house prices took over as the relevant asset price for those who wanted monetary policy to react to misalignments.

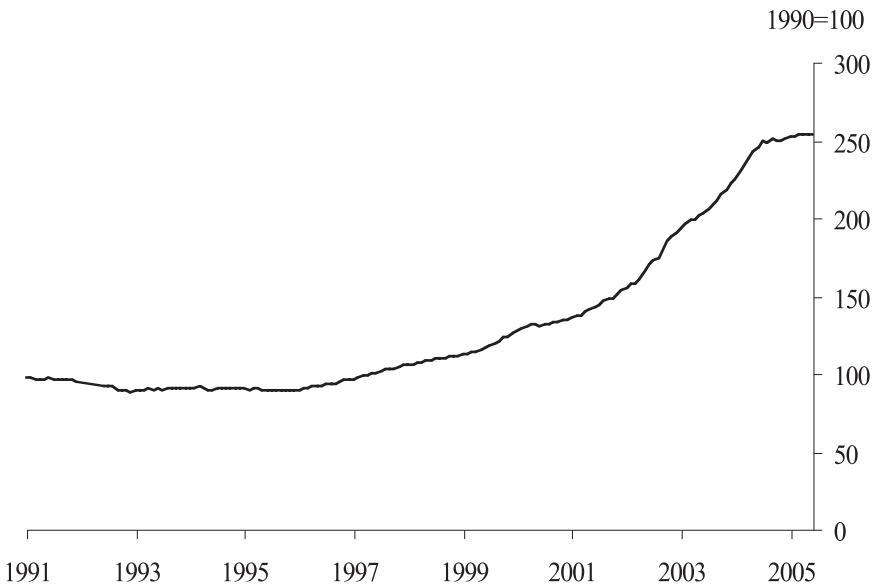
Interestingly, those who wish monetary policy to respond specifically to asset price misalignments would have had to switch from a policy of lower interest rates in response to sterling overvaluation to a policy of higher interest rates in response to house price overvaluation. Before discussing the relationship between house prices and monetary policy in recent years, it is helpful to look at the history of house price inflation since the late 1990s and the views of some of the interested parties at the time.



**Figure 3.** The sterling ERI (1990 = 100). (Source: Bank of England. Note: The Bank of England now publishes a new sterling ERI measure, which is based on updated trade weights. This chart shows the old measure, but it is not very different from the new measure.)

### UK house prices from the late 1990s

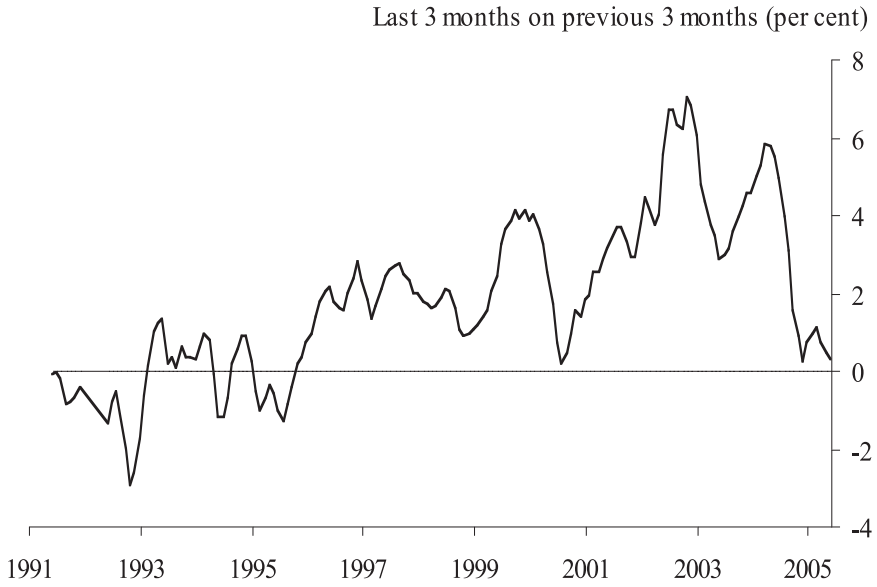
From January 1999 to July 2004, house prices in the UK rose by 123 per cent (see Fig. 4a).<sup>5</sup> But it was only when the ratio of house prices to average earnings started moving rapidly above its long-run average level of around 4 in 2001 (see Fig. 5) that commentators started noticing and in April 2002, when the ratio was getting close to 5, John Wriglesworth of Hometrack warned: ‘The danger is only starting and the seeds have been sown for housing market doom’.<sup>6</sup> In May 2002 Sushil Wadhvani, in his last month on the MPC, noted: ‘I believe that a clear signal from monetary policymakers that they would, other things being equal, react to a bubble if one clearly emerged would make the continuance of strong house price growth less likely now’ (Wadhvani, 2002, p. 21).



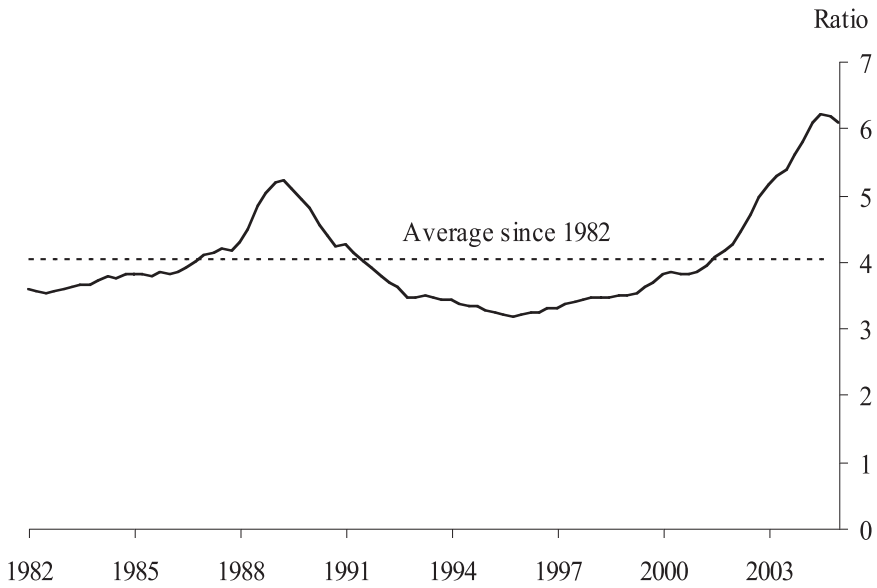
**Figure 4(a).** The level of house prices. (Sources: Halifax and Nationwide.)

<sup>5</sup> All statistics on house prices refer to an average of the Halifax and Nationwide house price indices.

<sup>6</sup> This and future quotes not explicitly referenced are to be found at [www.housepricechat.co.uk](http://www.housepricechat.co.uk)



**Figure 4(b).** House price inflation. (Sources: Halifax and Nationwide.)



**Figure 5.** UK house prices relative to average annual earnings. (Sources: Halifax, Nationwide and ONS.)

By November 2002, Andrew Oswald in a piece dramatically entitled ‘The Great 2003–2005 Crash in Britain’s Housing Market’, revealed that from the summer of 2003, he expected house prices to fall by 30 per cent and his advice to house owners was stark, namely ‘Sell now’ (Oswald, 2002, p. 2).

Andrew Farlow indicated there was a housing bubble and asked ‘How will the bursting of the current UK house price bubble look?’ The answer is that ‘At some point it will either deflate gently or burst dramatically. And evidence overwhelmingly supports the latter’ (Farlow, 2002, p. 3).

One year later, in November 2003, house prices were 16 per cent up on a year before and some commentators were taking a rather different line. ‘There is more chance of finding Elvis on the moon than there is of a house-price crash next year’ (John Wriglesworth, November 2003). By April 2004 house prices were up a further nine per cent and warnings of doom were everywhere. For example, Tony Dye remarked ‘It will all end in tears. I have thought this for some time, but I think we really are probably somewhere near the end of it’ (April 2004). He was backed up by Gavin Cameron—‘No overvaluation of this kind has been corrected without a crash’ (April 2004), Andrew Oswald—‘Herd instinct and confidence is holding up the market but in the long run, that won’t work’ (April 2004) and Martin Wolf—‘Nobody knows when the bust will come. But come, I believe, it will’ (*Financial Times*, 16 April 2004). However, others were sceptical about a crash. Stephen Bell (Deutsche Bank) ‘Would happily wager £100 for charity that Tony Dye’s forecast is wrong’ (April 2004).

In July 2004 house prices more or less stopped rising and by November 2004, Phil Spencer felt able to remark that ‘Public sentiment has finally accepted there will not be a crash’. At the time of writing (September 2005) there has been no sign of a crash with house prices up a little since the previous July.

So what does this pundit based history of house prices reveal from the perspective of a monetary policy maker? The key feature of this history is the fact that commentators (either implicitly or explicitly) disagreed significantly on the long-run equilibrium level of house prices, on where house prices were heading and on the extent to which there was a misalignment or bubble. So how does this relate to monetary policy?



### **UK monetary policy and the housing market since the late 1990s**

House prices are relevant for the operation of monetary policy irrespective of whether or not it responds to asset price misalignments because of the positive empirical relationship in the UK between house price inflation and household consumption growth<sup>7</sup> and hence future inflation. Thus, in the words of Bernanke and Gertler (1999), current house price inflation ‘helps to forecast inflationary or deflationary pressures’.

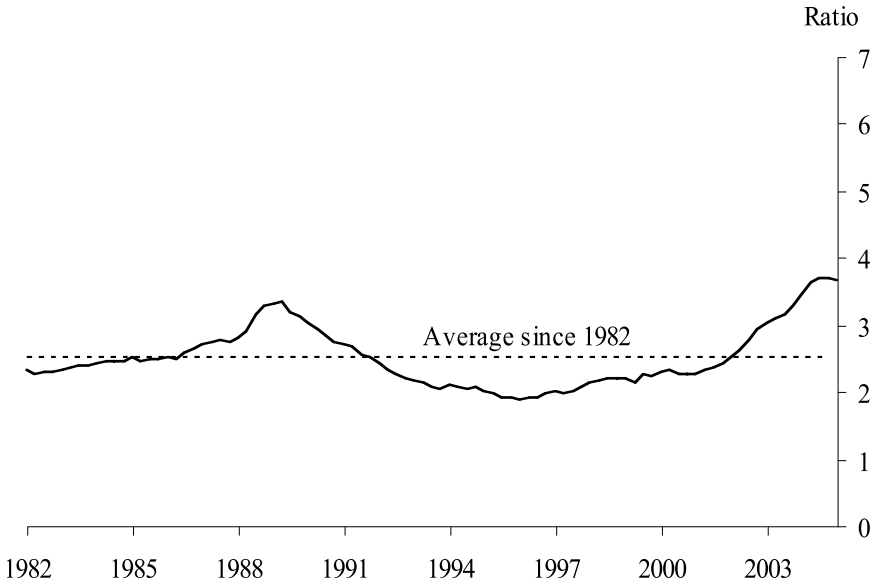
As we have already seen, it appears to be particularly difficult to pin down the equilibrium level of house prices. Many start from Figure 5 and some simply argue that it is clear that the ratio of house prices to average earnings is stationary and that the equilibrium value of this ratio is at, or close to, its long-run average. So, by mid-2004, house prices were a little over six times average earnings and this ratio would have had to fall by around 35 per cent to reach its average level since 1982.

The first obvious point is that the level of individual earnings is not the natural denominator. Rather, average household disposable income seems more reasonable. This is relevant because the proportion of two-earner households has been rising steadily over the last twenty-five years. So if we restrict ourselves to the top 70 per cent of income earners, because the majority of the rest are on state benefits and are unlikely to be in the market for houses, we see from Figure 6 that the ratio of house prices to the average household income of the top 70 per cent of households was around 3.7 in mid-2004 and would have had to fall by about 32 per cent to reach its average level since 1982, a fall which is some three percentage points lower than if we use earnings in the denominator. This fall is still substantial, however, so why might the equilibrium ratio have risen in recent years?

There are three factors which may be of some significance. First, the rate at which new dwellings are being built is at an historically low level whereas, for a variety of reasons, the growth in the population of working age and the net rate of formation of new households is relatively high (high divorce rates, high immigration rates etc.).<sup>8</sup> Second, there is the disappearance of the front end loading problem when inflation rates and

<sup>7</sup> Recent evidence suggests that the main factor underlying this relationship is the fact that both house prices and household consumption tend to be positively related to expectations of future earnings. The collateral effect, arising from the fact that higher housing equity allows for increased secured borrowing at real interest rates which are markedly lower than unsecured rates appears to play a minor role. See Attanasio *et al.* (2005).

<sup>8</sup> Barker's Interim Report (2003) has a lot of information on these issues.



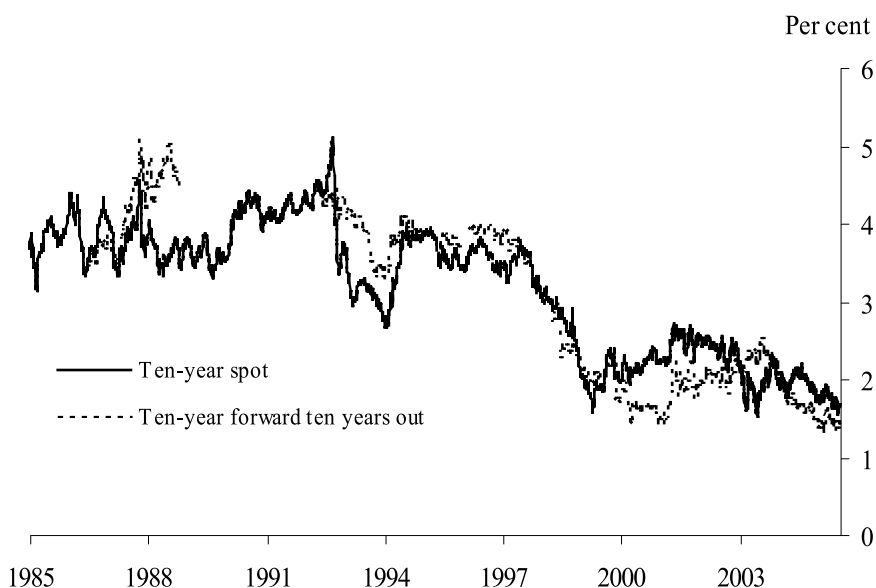
**Figure 6.** Ratio of house prices to average household disposable income (top 70% of households). (Sources: General Household Survey, Halifax, Nationwide, and ONS.)

nominal interest rates are low. For example, it might be quite sensible for young professionals to borrow, and for banks to lend them, four or even five times annual earnings to purchase a house given both their very high level of job security and their very rapid rate of prospective earnings growth. But in times of high inflation and high nominal interest rates, this is not possible. For example, suppose real interest rates are three per cent. Then if inflation is 12 per cent and nominal interest rates are 15 per cent, a person borrowing four times their annual pre-tax salary will be paying over 60 per cent of this pre-tax salary in mortgage payments in the first year—this simply cannot be done. Of course, in later years this proportion will fall rapidly. Nevertheless, the early years will provide a binding constraint on the multiple of earnings households can borrow.<sup>9</sup> In a low inflation environment, this binding constraint disappears. If inflation is two per cent and nominal interest rates are five per cent, an individual borrowing four times their annual salary will only be paying 20 per cent

<sup>9</sup> Of course, the front-end loading problem can be entirely eliminated if the lender, at the end of each year, raises the nominal mortgage loan to offset at least some part of the real reduction in the loan which has come about via inflation. Presumably because of the high transactions costs involved, such behaviour was not common during the high inflation period.

of it in mortgage payments in the first year. Perfectly possible. So the elimination of this constraint as we have gradually moved from a high inflation, high interest rate era to a low inflation, low interest rate period will have raised the demand for housing in equilibrium, even when real interest rates remain unchanged.

The third factor underlying the potential rise in the equilibrium house price to earnings ratio is the apparently substantial and sustained fall in long-run risk free real interest rates. In Figure 7, we see the time paths of both the ten-year real rate and the ten-year forward, ten-year real rate, both derived from prices in the index-linked gilt market. Both these rates have fallen from close to four per cent in the mid-1990s to around two per cent since 1999. And the fact that the ten-year forward, ten-year real rate has fallen in exactly the same way as the spot rate suggests that markets expect the fall to have some degree of permanence. It is, however, possible that the measured fall in the risk free real rate derived from the index-linked gilt market may be overstated because of the Minimum Funding Requirement announced in the 1997 Pensions Act. This introduced an element of demand for index-linked gilts which was almost independent of the real yield. However, a long-term risk free real rate close to two per



**Figure 7.** Ten-Year real interest rates. (Source: Bank of England. Note: Real interest rates implied by index-linked gilts.)

cent is not particularly unusual in the UK given that the average long-term real rate in the period 1951–97 was 2.21 per cent according to Chadha and Dimsdale (1999, table 3). Furthermore, Larsen *et al.* (2003) indicates that ten-year risk free real rates computed from a consumption based capital asset pricing model with habit persistence also fell significantly from 1997 on. Finally, long-run risk free real rates have fallen significantly across the world in the last decade.

Long-term real rates are, of course, crucial in the housing market since they reflect the average rate which should be used to discount the returns on a long-lived asset and the real cost of long-term borrowing. One way of measuring the consequences of a fall in real interest rates on equilibrium house prices is to make use of the equilibrium relationship between rents in the housing market and house prices. (See Weeken, 2004 and Goldman Sachs, 2004 for examples.) If real net rentals (i.e. after subtracting maintenance and management costs) today are  $D$  and they are expected to grow at a rate of  $g$ , then in equilibrium, the real price of houses,  $P_h$ , will equal the discounted present value of real rents, that is  $P_h = D/(r_f + \rho - g)$  where  $r_f$  is the risk free real interest rate and  $\rho$  is the risk premium.<sup>10</sup> This means that for plausible values of  $\rho$  and  $g$ , real house prices are very sensitive to changes in the risk free real rate. For example, suppose rents grow at the same rate as real wages which implies that  $g$  is around two per cent and the long-run risk premium averages around three per cent (see Weeken, 2004). Then if the risk free real rate falls from four per cent to two per cent the equilibrium ratio of real house prices to real rents will rise by nearly 67 per cent. Given our assumption that real rents tend to grow at the same rate as real wages, an assumption broadly consistent with the facts, the equilibrium ratio of house prices to earnings may be expected to rise by a similar amount solely because of the observed fall in the long-term real interest rate. And since the actual ratio of house prices to earnings has risen by around 70 per cent since the mid-1990s to the present day, it may be argued that it is close to equilibrium. Of course this is a very rough and ready calculation. The remains of MIRAS (tax relief on mortgage interest payments) were still in operation in the mid-1990s, although its impact was small by that stage. Transactions costs in the housing market are substantial and the rental market is subject to many tax and regulatory distortions. Furthermore, as we have seen, estimates of equilibrium house prices are sensitive to the value of the long-run real interest rate. For example, in

<sup>10</sup> The present value of real rents is:  

$$\int_0^{\infty} D e^{gt} e^{-(r_f + \rho)t} dt = D/(r_f + \rho - g), \text{ so long as } r_f + \rho - g > 0.$$

Goldman Sachs (2004), it is assumed that the real long-term rate will rise to 2.75 per cent. This is a key factor underlying their prediction of a 20 per cent fall in house prices by 2008.

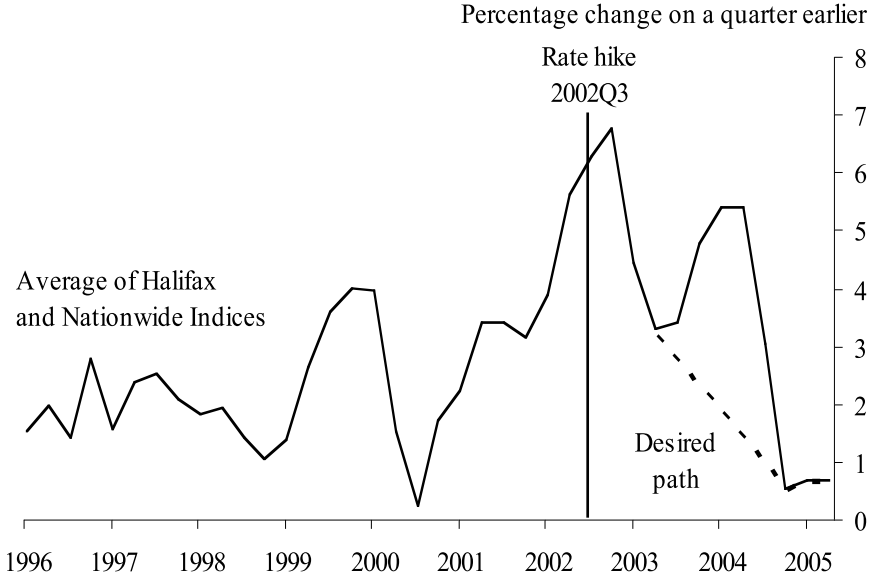
Overall, this discussion leads us to conclude that there has probably been a substantial rise in the equilibrium house price to earnings ratio since the mid-1990s.<sup>11</sup> Of course, there is a good deal of uncertainty here, but it is clear that it may be legitimately argued that there has been no housing bubble whatever (see CESifo, 2005, ch.5 where this argument is extended to other European countries). It also explains why there is such widespread disagreement among commentators on the issue of where the housing market is going at any particular time. Finally, it is clear that anyone who takes the view that monetary policy should respond specifically to misalignments or bubbles in asset prices would have had a very hard job in recent years with regard to house prices because the existence of a bubble was never clear.

### **How much would interest rates have had to rise to impact on the housing market?**

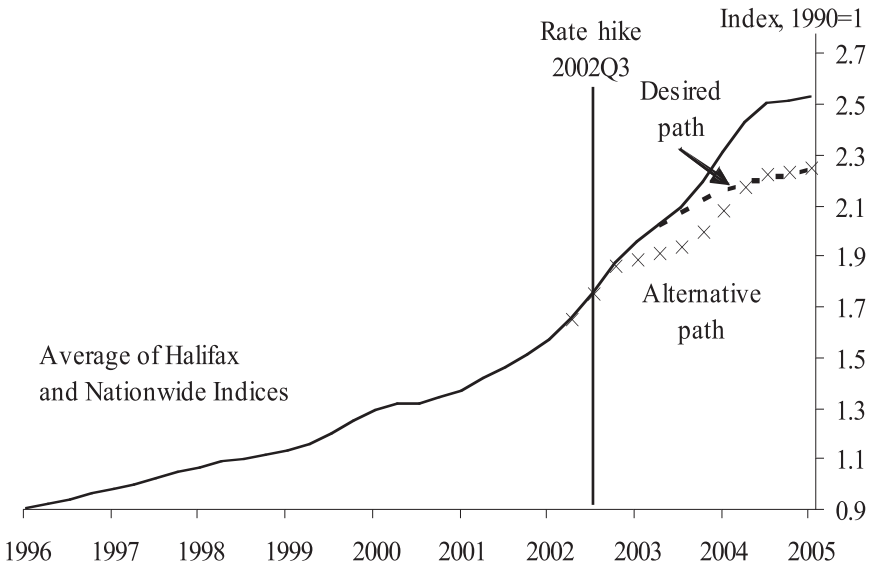
One of the most interesting features of the argument about how to respond to asset price misalignments, particularly with regard to the recent house price boom, is that supporters of bubble pricking rarely tell us about the rate rises they would recommend. Suppose, for example, that it was clear by late 2002 that there was a housing bubble and that, in the words of Andrew Farlow, 'We would be better served by . . . monetary policy that takes the possibility of housing bubbles seriously' (Farlow, 2002, p. 4). Then what sort of interest rate rises are required? Pretty big, is the view of Willem Buiter, '50 basis points, or even 150 basis points in a housing boom is tackling an elephant with a peashooter', House of Lords, 2004, p. 127, Q411.

Using the Bank of England model and house price equation, we try and answer this question. Of course, any answers we obtain have to be treated with caution since they are bound to be subject to substantial error. However, they should give us the right order of magnitude. Taking house price inflation in Figure 8, what sort of rise in interest rates in 2002

<sup>11</sup> This conclusion is completely at variance with that set out in Farlow (2004). The main reason is that Farlow only considers short-run real interest rates which have fallen little since the mid-1990s. However, when purchasing a very long-lived asset, the long-run real interest rate is substantially more relevant and this has fallen since the mid-1990s.



**Figure 8(a).** Pricking the house price bubble: alternative path of house price inflation. (Sources: Halifax, Nationwide and Bank of England.)



**Figure 8(b).** Pricking the house price bubble: alternative path of house prices (Sources: Halifax, Nationwide and Bank of England.)

would have been required to eliminate the surge in house price inflation in 2003–4 and generate instead the dotted path (Fig. 8a)? It is hard to do this exactly, but to produce a close path which ends up at the same level as the dotted path (the xxx path in Fig. 8b), we need a 300 basis points rise in the interest rate in 2002 Q3 which lasts for 13 quarters. Not surprisingly this interest rate shift has a significant impact on the overall economy, taking more than a half per cent off GDP in 2003 and one per cent off inflation in 2004. Thus, to ‘prick the housing bubble’ involves a substantial cut in GDP and a dramatic undershoot of the inflation target.<sup>12</sup> Unfortunately, the Bank of England model cannot be used to compute the long-term benefits of pricking the housing bubble because this would depend crucially on whether or not there is going to be a housing crash on account of the bubble not being pricked. As yet, no such crash has been observed. As it stands, at the moment it is impossible to say whether pricking the bubble at this cost would have been worth it. Currently, it looks unlikely.

#### 4. The switch in the inflation target

In December 2003 the Chancellor announced that the inflation target which the Bank of England Monetary Policy Committee would have to hit was going to change from 2.5 per cent on the RPIX measure to two per cent on the CPI measure (previously known as the HICP measure).<sup>13</sup> This new target was to take effect from December 2003. This announcement was not a surprise since the Chancellor had previously announced in the Spring of 2003 that he was going to switch the inflation target to a new level based on the HICP measure at some point. At that stage he did not specify the numerical value of the proposed new target.

The main differences between the old inflation measure (RPIX) and the new one (HICP or CPI) were well known at the time of the initial announcement in the Spring of 2003 and were as follows:

<sup>12</sup> At first sight, this level of response to a 300 basis point rise in interest rates may seem rather modest. To generate these numbers, I suppose that the temporary nature of the rise in interest rates is known to the general public and further, that inflation expectations remain anchored at the 2 per cent target. If, as might well have been the case in practice, such a move in interest rates detached inflation expectations from the target, the fall in economic activity and inflation would have been significantly larger.

<sup>13</sup> RPIX is the Retail Price Index excluding mortgage interest payments, CPI is the consumer Price Index and HICP is the Harmonised Index of Consumer Prices.

**1** *In the HICP (CPI), the geometric mean is used to aggregate price changes at the most basic level whereas the RPIX used the arithmetic mean. Since the geometric mean of a group of different positive numbers is always less than the arithmetic mean of the same group of numbers,<sup>14</sup> this difference in the construction of the two measures will always tend to make HICP (CPI) inflation lower than RPIX inflation. This is the *formula effect* and, on average, makes HICP (CPI) inflation 0.5 percentage points per annum lower than RPIX inflation.*

**2** *HICP (CPI) excludes housing depreciation, council tax and dwellings insurance. RPIX includes these.*

The housing depreciation element and council taxes have tended to rise faster than the other elements of RPIX, on average. Their exclusion will therefore tend, in the long run, to lower measured inflation assuming that house prices track earnings over the long term and council tax rates continue to rise faster than 2.5 per cent per annum. The long-run impact of this *housing effect* is likely to make HICP (CPI) inflation around 0.3 percentage points per annum lower than RPIX inflation.<sup>15</sup>

**3** *HICP (CPI) includes university accommodation fees, foreign students' tuition fees, stockbrokers' charges. RPIX excludes these. Also there are numerous other minor differences.*

On average over the period up to the time of the switch, these differences between HICP and RPIX contributed nothing to the long-run average inflation rate differentials between the two measures.

The differences under points **1** and **2**, when combined, suggest a long-run average differential between HICP and RPIX inflation of 0.8 percentage points per annum. In the shorter term, there is a great deal of variation in the differential as we can see from Figure 9. While the formula effect is relatively stable, the housing and other elements of the differential are highly volatile. Back in 2003 the differential was very large because the housing depreciation element, which depends on recent rates of house price inflation, was making such a large contribution to RPIX

<sup>14</sup> If there are two numbers,  $a_1, a_2$  the arithmetic means (AM) is  $\frac{1}{2}(a_1 + a_2)$  and the geometric mean (GM) is  $(a_1 a_2)^{1/2}$ . If there are  $n$  numbers,  $a_1, a_2, \dots, a_n$ , the AM is  $\frac{1}{n}(a_1 + a_2 + \dots + a_n)$  and the GM is  $(a_1 a_2 a_3 \dots a_n)^{1/n}$ . So long as the numbers are all positive and not all the same, a famous theorem states that the GM is less than the AM. For example if  $a_1 = 1, a_2 = 4$  the AM is  $\frac{1}{2}(1 + 4) = 2\frac{1}{2}$  and the GM is  $(1 \times 4)^{1/2} = 2$ .

<sup>15</sup> This is based on a long-run rate of house price inflation of 4.5 per cent (in line with trend average earnings growth) and council tax rises of 6.5 per cent a year (the average gap between council tax rises and RPIX inflation over the period 1997–2003 is around 4 percentage points).



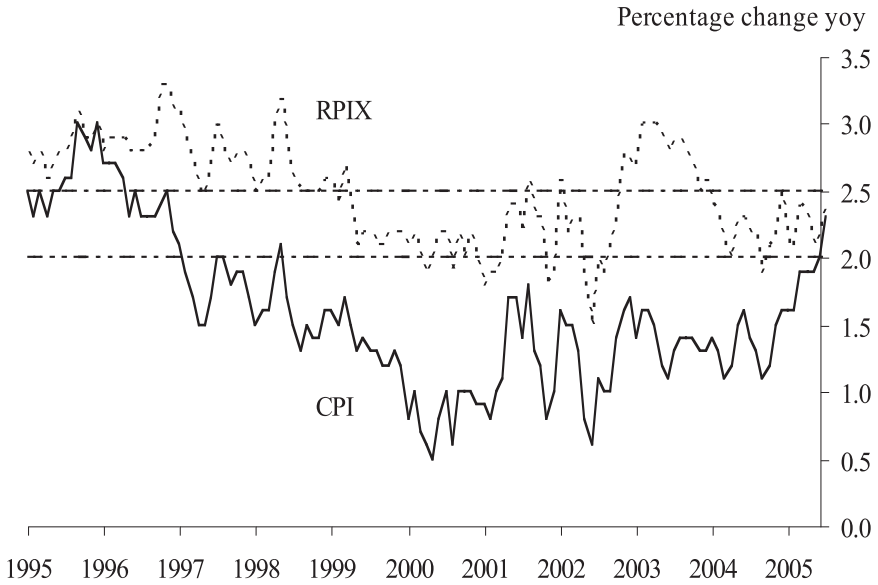


Figure 9(a). RPIX and CPI inflation. (Source: ONS.)

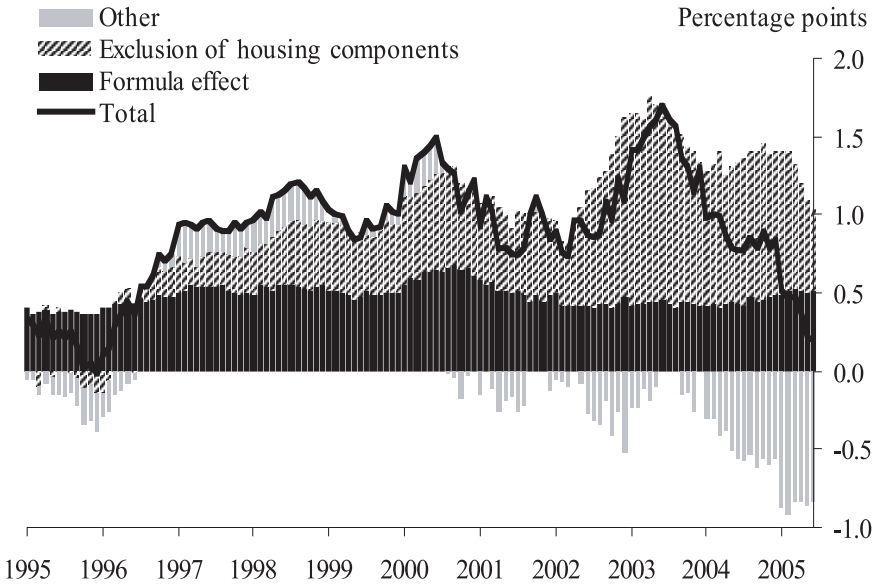


Figure 9(b). Contributions to the differential between annual RPIX inflation and HICP inflation. (Sources: ONS and Bank of England.)

inflation.<sup>16</sup> But even the long-run average differential of 0.8 is large. So the switch to the HICP (CPI) measure of inflation meant that measured inflation was considerably lower, on average, than it would have been had we stuck to RPIX.

So what were the implications of this switch for monetary policy?

### Monetary policy after the switch

The old price index, RPIX, and the new price index, CPI, are both cost of living indices. According to the latter, the cost of living is rising at an average of 0.8 percentage points per annum more slowly than under the RPIX measure. Whichever is used, however, makes no difference whatever to the rate of increase of the true cost of living, of which RPIX and CPI are simply different measures. This implies that the real interest rate under RPIX is, on average, 0.8 percentage points lower than the real interest rate under CPI, *ceteris paribus*. The true real interest rate is, of course, unaffected by the measure which is used. The same applies to real wage growth which is, on average, 0.8 percentage points lower under RPIX than under CPI, *ceteris paribus*. Again, the true level of real wage growth is unaffected.

Following on from these arguments, in Nickell (2003b), prior to the switch in targets, I set out the implications of the prospective switch for monetary policy. It is interesting to see to what extent these implications stand up now that the switch has taken place. The four implications in Nickell (2003b) were as follows.

**Implication 1** *The long-run stance of monetary policy will be unaffected by the switch to an HICP target.*

This was simply based on the argument that the switch would have no

<sup>16</sup> The housing depreciation element of RPI is supposed to capture the contribution to the cost of living of the cost associated with maintaining homes in response to their natural tendency to depreciate over time—e.g. replacing the roof when necessary. This element was only introduced into the RPI in 1995 as a consequence of a majority recommendation of the RPI Advisory Committee (see CSO, 1994). This majority recommendation suggested that the costs associated with putting right the deprecations of ageing in homes was best measured by a distributed lag on house prices. As the closely argued minority view expressed by Michael Fleming, Rita Maurice and Ralph Turvey noted, there was a serious problem here, namely that a substantial proportion of the rise in the price of housing reflects a rise in the price of land. Since land does not depreciate, the price of housing does not accurately reflect housing depreciation costs, indeed it typically overstates them (although not always; it probably understates them when house prices are falling). Arguably, some index of building costs would probably have been a better indicator of housing depreciation costs.

long-run *real* impact on the economy, including on the true real interest rate. In Figure 10, we see that there is no noticeable shift in UK real interest rates in or around December 2003.

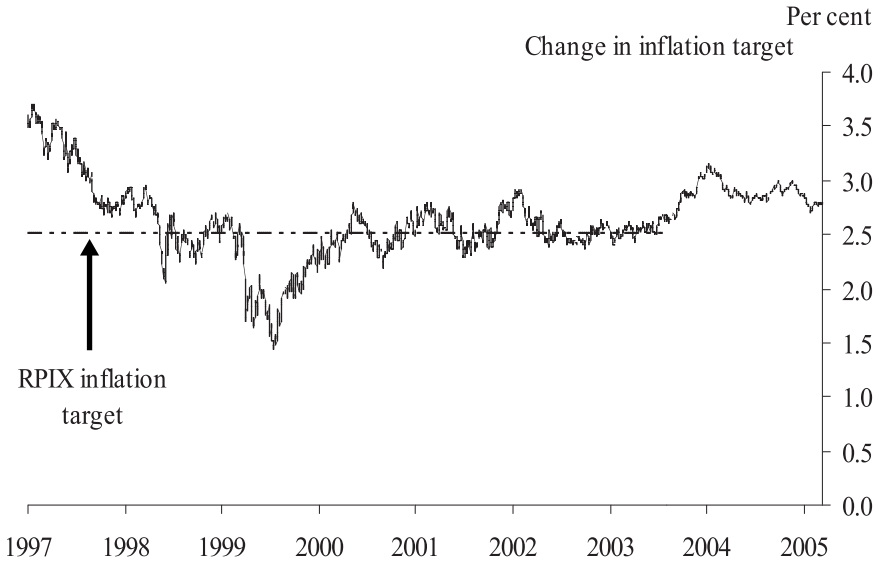
**Implication 2** *If the HICP target is set at two per cent, this is equivalent, in the long run, to a switch from an RPIX target of 2.5 per cent to an RPIX target of 2.8 per cent. Since the long-run real interest rate is unaffected by the switch (see Implication 1), the long-run nominal interest rate will be 0.3 percentage points higher after the switch*

As it happened, the CPI (HICP) target turned out to be two per cent, so given that the average gap between this and RPIX inflation is 0.8, this represents a genuine switch of target. This implication is borne out by the fact that the market based RPI inflation expectations series shifts from around 2.5 per cent to close to 2.8 per cent at the beginning of 2004 (see Fig. 11). The last part of the implication concerning the long-term nominal interest rate cannot be checked because these interest rates tend to be quite volatile and the counter-factual is completely unobserved.

**Implication 3** *If the HICP target is set at two per cent, this implies that the short-term monetary policy stance has to be such as to raise the*



**Figure 10.** Ten-year UK forward real interest rates. (Source: Bank of England. Note: These rates are based on the yields on index-linked gilts and are based throughout on the RPI.)



**Figure 11.** Market based ten-year ahead inflation expectations. (Source: Bank of England. Note: This chart shows the ten-year ahead annual inflation forward rate, defined as the difference between the ten-year ahead annual nominal rate and the ten-year ahead annual real rate. The real rates are based on the yields on index-linked gilts and are based throughout on the RPI.

*longer-term inflation rate by 0.3 percentage points. This involves slightly looser monetary policy for a limited period than would otherwise be the case. However, given the large variations in the gap between HICP and RPI inflation and the frequent shocks to which the economy is subject, this temporary loosening would be barely noticeable in practice.*

Given the 0.8 percentage point long-term gap, a 2.5 per cent RPIX target is equivalent to a 1.7 per cent HICP (CPI) target. Hence the 0.3 percentage point rise in inflation required to hit a two per cent HICP target. Since the beginning of 2004, CPI inflation has indeed risen so that it is now close to the two per cent target. However, this has, in the main, followed from the steady rise in the price of oil over the same period.

**Implication 4** *A switch to an HICP target of two per cent today should have little or no impact on the current stance of monetary policy despite the large gap between RPIX and HICP inflation. This is because this large gap is only temporary, generated by the recent surge in house price inflation which impacts on RPIX via the housing depreciation element but not on HICP. As this surge fades away, the gap will close to more normal levels and*

*given the structure of the August RPI projection, the corresponding HICP projection would not be very different from two per cent towards the end of the forecast horizon.*

When this was written (September 2003), the gap between HICP and RPIX was very large. Since that time it has indeed narrowed significantly following the slowdown in house price inflation and other factors (see Fig. 9) and CPI (HICP) inflation is indeed close to the two per cent target. Over the period of the switch, interest rates were rising but, as the MPC Minutes of the era make plain, the target switch had no significant impact on policy. In the light of all this, was the target switch a good thing?

### **Was the switch from an RPIX target to a CPI target a good thing?**

The main differences between the RPIX and CPI indices are the first two set out earlier (see above, p. 24). The use of the geometric mean in the aggregation of price changes is definitely superior to the use of the arithmetic mean because only the former takes some account of the fact that consumers will tend to substitute away from goods whose prices rise the fastest towards goods whose prices rise the slowest. In this sense the switch represents an improvement. The omission of housing costs is a more contentious issue. The housing depreciation element in RPI has a weight of around 4.4 per cent and is based on a distributed lag of the ODPM measure of house prices. As we have already noted (see above, n. 16), this is not a good measure of housing depreciation and was only introduced into the Retail Price Index in 1995. However, it has had a significant impact on RPIX in recent years. Thus the burst of house price inflation from 2002 generated a significant surge in RPIX inflation to levels well above target for much of 2003. No such surge can be observed in CPI inflation.

In my view, incorporating house prices directly in a consumer price index is not a good idea. There may be a good argument for including the user cost of housing and, ignoring capital gains, the real user cost is  $P_h(r_f + \rho + \delta)$ , where  $P_h$  is the real price of houses,  $r_f$  is the long-term risk free real interest rate,  $\rho$  is the risk premium and  $\delta$  is the rate of depreciation. While this is proportional to house prices, if real house prices over the long haul are being driven by changes in the long-term real interest rate, then fluctuations in house prices will not adequately reflect fluctuations in user cost. It is better, in my view, to use market rents as a proxy for the user cost of owner-occupied housing.

Turning to the monetary policy implications of the housing depreciation element in RPIX, as it happens, the house price generated surge in RPIX inflation in 2003 had little impact on UK monetary policy essentially because the MPC failed to forecast the inflation surge at an early enough date.<sup>17</sup> Of course, the house price explosion had a strong effect on monetary policy because of its impact on consumption and aggregate demand. But this would have been the case even if CPI had been targeted.

On balance, therefore, I view the switch from an RPIX target to a CPI target as a positive move. It has had little impact on monetary policy and CPI is a superior price index. The only drawback with the CPI index is that it does not capture owner-occupied housing costs at all. This awaits an agreement at the European level. However, it is arguable that omitting this element of the cost of living altogether is better than actually incorporating house prices as a flawed measure of housing depreciation or owner-occupied housing costs.

## 5. Summary and conclusions

I have considered three topics: first, the rise in household debt and its implications for monetary policy; second, the role of asset prices in monetary policy; third, the implications of the switch in the inflation target at the end of 2003.

The conclusions are as follows. The driving force behind the dramatic rise in household debt over the last thirty years is the continuing rise in owner-occupied dwellings and in the proportion of households with a mortgage. More recently, the rapid rise in house prices has also been important. Interestingly enough, the overall rise in household debt over the last eight years has not had a big impact on consumption growth because, over the same period, there has also been a significant increase in the rate of accumulation, by households, of financial assets. Finally, while it is possible that higher levels of debt may make household consumption more sensitive to interest rate changes, this may easily be offset simply by moderating these same changes.

<sup>17</sup> A careful study of the Bank of England forecasts reveals that the surge in RPIX inflation above target during 2003 was first predicted in November 2002. Since changes in the interest rate at that point would have had little impact on inflation until 2004, this surge had no significant effect on monetary policy.

Concerning the role of asset prices in monetary policy, here we have analysed the implications of the 2002–4 UK housing boom. The overall conclusions are first, it is impossible to tell whether or not there has been a house price bubble in the light of the fall in UK long-term real interest rates from around four per cent in the mid 1990s to around two per cent by 2000. Second, to have any significant impact on the housing boom, the MPC would have had to raise interest rates by around 300 basis points for three years from late 2002. This would have cut GDP growth by more than half a per cent in 2003 and sent inflation far below target in 2004. Third, it is impossible to say, at the moment, whether or not such a policy would have been worth doing in order to reduce the size of the subsequent housing market crash. Since no crash has yet been observed, currently it seems unlikely that the ‘bubble pricking’ policy would have been sensible, *ex post*. And, who knows, if the MPC had raised interest rates by three hundred basis points in 2002, sterling might truly have risen to unsustainable levels!

Finally, the switch from a 2.5 per cent inflation target on the RPIX measure to a two per cent inflation target on the CPI (HICP) measure, at the end of 2003, turned out to have minimal implications for monetary policy. Furthermore, the CPI is a marginally superior cost of living index relative to the RPIX.

*Note.* I am most grateful to Jumana Saleheen for her valuable help in the preparation of this paper, and to Kate Barker, Mervyn King, Jumana Saleheen, David Smith, David Walton and members of the audience at the British Academy for comments on an earlier draft.

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