BANK OF ENGLAND

Speech

A Matter of No Small Interest: Real Short-term Interest Rates and Inflation since the 1990s

Speech given by

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To the Institute of Directors and Milton Keynes Chamber of Commerce at Cranfield University

2 March 2005

I would like to thank Lavan Mahadeva, Alex Muscatelli and Jonathan Marrow for their invaluable research assistance in preparing this speech; also Peter Andrews, Ryan Banerjee, Kate Barker, Charles Bean, Rebecca Driver, Mike Joyce, Mervyn King, Peter Lildholdt, Ben May, Michael Sawicki and Tony Yates for comments on an earlier draft. The cross-country analysis of real interest rates and inflation over the cycle presented here builds on earlier empirical work by Jenny Greenslade, Stuart Lee and Neil Parker. Luca Benati estimated the time series of conditional volatilities of UK interest rates and inflation. I am grateful to them all. The views expressed are my own and do not necessarily reflect those of either the Monetary Policy Committee or the Bank of England

1 UK inflation as measured by the Consumer Price Index has fluctuated in a relatively narrow band of around 1/2 to 2% for eight years. Much attention has recently been focused on why inflation has been so subdued and whether it will continue; two of my colleagues on the MPC, Richard Lambert and Steve Nickell, have given speeches on the subject[1].

2 One aspect that has surprised has been the combination of sustained low inflation and real rates of economic expansion that have by historical standards been relatively rapid. In a series of publications the MPC have pondered the reasons for the apparent change in the relationship between wage growth and unemployment in particular, and between demand pressure and price inflation more generally. The Committee concluded that a combination of increased potential supply in the British economy and a more favourable short-run trade-off between excess demand and inflation may have been responsible.[2] In its central projections the Committee has assumed that this will continue to some degree, at least in the near term.

3 This evening I want to concentrate on another aspect to this apparent improvement in the inflation-output trade-off: how is it that persistently low inflation and steady growth in nominal demand has been accompanied by such low short-term interest rates?[3] UK official interest rates have peaked at successively lower levels: 15% in 1989, 7½% in 1998 and 6% in 2000. Rates troughed at 3½% in 2003. And this phenomenon is not just confined to the UK. Across a wide range of major industrialised economies both inflation and short-term interest rates have been unusually low in recent years.

4 One explanation for persistently low short-term interest rates in the major economies is of course low inflation itself. The lower inflation, the lower nominal interest rates can be for a given real return. But that isn't the whole story. Even adjusting for inflation, short-term real interest rates have been low. The average ex-post real rate in the UK rose to over 2% in 2004, up from a low in 2003 but still short of the near 7% level it reached in 1990.[4] Using an eclectic mix of methodologies for estimating real interest rates, Larsen, May and Talbot (2003), find a step down in 1-year real interest rates in the UK at around the time of the introduction of inflation targeting in 1992.

5 Indeed, it appears that the lower the inflation rate, the lower the real, inflation adjusted short-term interest rate over the economic cycle.

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[1] Lambert (2004), Nickell (2005).
[2] See for instance MPC Minutes February 2004 and November 2004, *Inflation Report* February 2004, February 2005.
[3] This is a separate but related issue to that of low long-term interest rates and the low expected future short-term rates that are embodied in them.
[4] Calculated by subtracting average annual RPIX inflation from the annual average base rate.

6 Chart 1 shows an empirical observation I became aware of some years ago[5]. It plots average inflation over an economic cycle against the average inflation adjusted short-term interest rate for up to 2 economic cycles in 11 economies, a total of 15 observations in all.

7 By focusing on average over the cycle data, one might think that the average real interest rate used comes close to an estimate of the natural real rate, defined as the real interest rate that is consistent with stable inflation and an economy growing in line with its potential. Conceptually the natural real rate of interest is the rate that would prevail were all prices fully flexible so that aggregate demand always equalled aggregate supply[6]. However, just as with other conceptually appealing ideas, such as the natural rate of unemployment or the output gap, in practice the natural rate of interest is not observable and must be inferred from the behaviour of output and inflation. Estimates are very uncertain.

8 From the chart it appears that the average short-term real interest rate over the cycle is positively related to the inflation rate; the higher the inflation rate, the higher on average the real interest rate. For the period from the late 1980s, this finding is robust to different methodologies, including using estimates of ex-ante real interest rate expectations and alternative specifications of the economic cycle. A casual survey of economic history might also appear to support this finding. In the 1950s and 1960s when inflation was low, short-term real interest rates in the UK were also low[7]. However, a positive relationship between real short-term interest rates and inflation was not apparent during the high inflation decade of the 1970s.

9 On the face of it, this seems odd. Economists have tended to assume that the neutral real interest rate is constant at around the long-term average real rate. Even sophisticated Dynamic Stochastic General Equilibrium models, which allow the natural rate to vary, only do so around a steady-state equilibrium rate that is assumed to be constant. We might expect the natural rate to vary with real economic developments. For instance, the MPC has suggested that the fall recently observed in real long-term interest rates might be related to increased planned saving by the ageing baby-boomer generation[8]; an increase in trend productivity growth might be expected, other things being equal, to lead to an increase in the real natural rate in the long-run; increased fiscal deficits might raise real long-term interest rates; and a lower natural real interest rate in recent years might have been the consequence of a series of negative demand shocks. But economic theory tells us that nominal values should on average be unrelated to the real economy [9]. So what factors might account for the apparent

[5] I am grateful to former colleagues at the Royal Bank of Scotland for earlier assistance with the collection and analysis of these data.
[6] See for instance Neiss and Nelson (2001) and Woodford (2003).
[7] Chadha and Dimsdale (1999) proxy inflation expectations by the three-year moving average of the ex-post inflation rate and examine the behaviour of the real rate in the UK from 1875-1997. On this ex-post measure, the short real rate averages 0.67 percent from 1951 to 1968.
[8] *Inflation Report*, February 2005.
[9] Indeed the Mundell-Tobin effect suggests that there should be a negative relationship between real interest rates and expected inflation. See, for example, Orphanides and Solow (1990).

positive relationship between average real short term interest rates and inflation over the last decade or so?

10 We can decompose the short-term nominal interest rate into the expected risk-free real post-tax return, tax, expected inflation and risk premia. But in simple calculations of the real rate of interest, following Fisher (1907), it is common to take a measure of inflation (either realised or expected) from the nominal interest rate. This is what I have done in the cross-country calculations. But these calculations make no allowance for either tax effects or risk premia. So the apparent fall in the sustainable real rate might reflect a smaller tax component or declining risk premia, rather than a lower risk-free real post-tax interest rate.

11 Since tax is paid on nominal interest income, we might expect the tax wedge between nominal and real interest rates to rise with inflation[10]. However, a series of papers in the 1970s and 1980s were unable to identify a consistent tax effect of the expected magnitude. But it is possible that the effect was obscured by other factors in earlier decades[11] and has only become apparent more recently.

12 Neither inflation expectations nor risk premia are directly observable. But the apparent fall in the sustainable real short-term interest rate may nevertheless be due to declining risk premia. This could result either because the environment is deemed to have become less risky, or because investors require less compensation for taking on the same amount of risk.

13 What evidence might there be for thinking that the economic environment might have become less risky? Well to start with, there is well-documented evidence that inflation is less volatile at lower inflation rates[12], as argued by Friedman in his Nobel lecture of 1977. A recent study by Cecchetti, Flores-Lagunes and Krause (2004) found that in a sample of 24 countries (including the US, UK and other EU members as of 2003) inflation variability fell in all countries from the 1980s to the 1990s. And indeed it appears that lower average real interest rates in several OECD economies in the 1990s have been associated with more predictable inflation outturns (defined as the conditional standard deviation), see Chart 2. This can also be seen from the UK experience, where falling inflation and nominal and real interest rates have been accompanied by greater predictability for all three series (Charts 3 and 4).

14 But inflation is not the only area in which the macro-economic environment appears to have become more stable of late. Output has also become more stable in the major economies. Indeed there is a view that these two phenomena, more stable inflation and more stable output, are related. A substantial literature has grown up to document and explain this increased stability, dubbed "The Great Moderation". Opinions differ as to whether it has resulted solely from good fortune, as the incidence

[10] This was noted by Darby (1975) and Feldstein (1976). I am grateful to Charles Bean for bringing it to my attention.
[11] As suggested by Peek (1982).
[12] See, for instance, King (2002).

and magnitude of shocks that buffet the world economy have reduced, or from improved management of macro-economic policy in the face of an unchanged incidence of shocks[13]. My own view is that the

explanation does not lie in a reduced incidence of shocks, but elsewhere. One need only think of the Asian crisis of 1997, the Russian default and Long Term Capital Management crisis of the following year, during which the operation of capital markets stalled, the dotcom collapse leading to the most synchronised global downturn since the war, 9/11 and volatility in several markets, from equities through housing to oil, to see that we still have our fair share of shocks. And it is probably worth saying at this point that my views on this matter date from well before my own stint as a policymaker, so are rather less biased than you might be tempted to think. As Benati (2004) shows, this phenomenon of reduced macro-economic volatility is also apparent in the UK for a range of economic data. Might that have led to an associated fall in real interest rates?

15 One method of estimating the risk premium in nominal interest rates uses bonds that are indexed for inflation. The difference in the yield on indexed and non-indexed bonds of the same maturity should tell us about the combined value of market participants' expectations of future inflation and the premium they are willing to pay for the risk those inflation expectations won't be realised. Scholtes (2002) and Peacock (2004) combine this with an independent measure of inflation expectations taken from surveys to arrive at a measure of the inflation risk premium. There are some important technical considerations to bear in mind in interpreting these data[15], some of which are more acute at shorter maturities, but nevertheless these results give some indication of the possible scale of the decline in the inflation risk premium. Scholtes suggests that the inflation risk premium, though volatile, might have fallen significantly in the early 1990s.

16 An alternative approach to estimating the risk premium is through the behaviour of consumers. Since the anticipated return from abstaining today and deferring consumption until tomorrow is given by the ex-ante expected real interest rate, we should be able to derive the expected real interest rate and associated risk premia from patterns of consumption. Following Ireland (1996) and Sarte (1998) the risk premium in a simple model can be shown to be a positive function of the unpredictability of inflation and the real interest rate; and a negative function of uncertainty about the covariance of future consumption and inflation. This last term is because the consumer will require a higher compensation for the risk of unexpectedly high future inflation the more likely this is to coincide with a period of unexpectedly low consumption growth.

17 It seems likely that the combined effects of the increased predictability of inflation and interest rates observed during the last decade or so might have acted to reduce the risk premium, as might enhanced opportunities to hedge these risks. And chart 5 suggests that real consumption growth might

[13] Bernanke (2004) explains how a better monetary policy response to shocks might show as diminished shocks in empirical work.
[15] See Breedon (1995), Scholtes (2002), Peacock (2004) and Tucker (2004).

be negatively correlated with inflation, though of course it is the unpredictable covariance in which we are interested. However, while estimates of the inflation risk premium for the UK using this approach clearly show a fall in the risk premium since the late 1980s, the scale, both of the risk premium itself and its fall over the period, is tiny. Although problems associated with this approach are well documented[16] and it is possible to make adjustments to deal with some of them that raise the premium, the total effect remains small compared with the observed fall in the real rate.

18 A more promising avenue to explore might be the approaches taken by Ang and Bekaert (2003) or Goto and Torous (2003), both of which incorporate the effects of regime change in calculations of the term structure of real interest rates and the risk premium in the United States. Ang and Bekaert find a relationship between real rates and inflation that varies across regimes and a stronger role for the inflation risk premium, which entirely accounts for the upward slope of the nominal term structure, but falls significantly in the 1990s. Goto and Torous find that a shift in the inflation process following the introduction of an anti-inflationary interest rate policy leads to a positive relationship between inflation and real interest rates. The risk premium in short-term interest rates initially increases significantly as policy becomes more activist, but might later be expected to decline as credibility is established and inflation shocks become less persistent.

19 So, in conclusion, it seems that experience across a range of economies since the late 1980s suggests that the natural rate of interest might have fallen. A reduced tax wedge between real and nominal rates at lower inflation rates is likely to have contributed. And it is possible that the decline might be partly associated with reduced risk premia, although it is difficult to derive estimates that are sufficiently large to account for a significant share of the observed fall in average real short-term interest rates. Shifts in inflation regime and greater associated macro-economic stability might also have played a role, both in lowering the risk-free real natural rate and enhancing the role of risk premia. Since the observed relationship between real interest rates and inflation is a relatively recent phenomenon which was not apparent in the 1970s, this explanation for the decline in real rates is appealing.

20 But, as with interpreting movements in potential supply and apparent improvements in the inflation-output trade-off, it would be risky for policy makers to assume that any apparent shift down in the real natural rate of interest is a permanent rather than a temporary phenomenon.

21 We can think of monetary policy as a balloon. If we squeeze air out of one part of a balloon, it will move to expand another part. But the overall volume of air will be unchanged, so long as we don't inflate or deflate the balloon. So it is with monetary policy. Relative price movements give the signals about demand and supply that lead to an effective allocation of resources and facilitate the smooth operation of the real economy. But movements in relative prices and price shocks cannot cause

[16] See for instance Larsen, May and Talbot (2003) for a summary of problems with the consumption capital asset pricing model.

general inflation or deflation in the medium term. So long as monetary policy is not expansionary a faster rate of increase in the price of some goods or services will in time be offset by slower increases in the price of others, as real incomes are squeezed. It is therefore important that monetary policy is set neither too hot nor too cold. Over the medium term that means ensuring that inflation expectations remain anchored to the target and getting the real interest rate right. Judging that in the face of uncertainty over the real natural rate of interest will continue to mean taking a pragmatic approach to policy.

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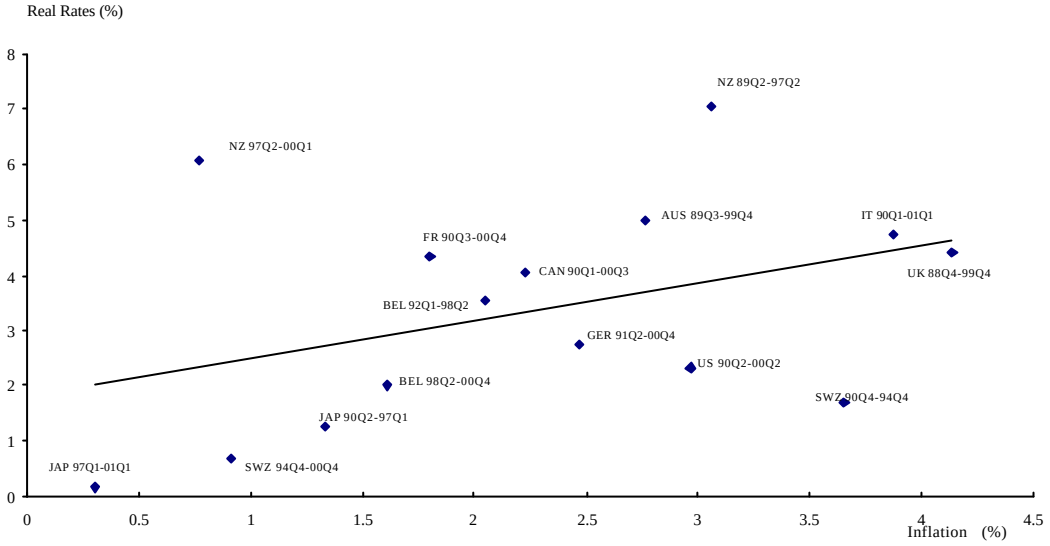
Appendix of Charts

Chart 1: Real interest rates and inflation over the cycle, 1990s



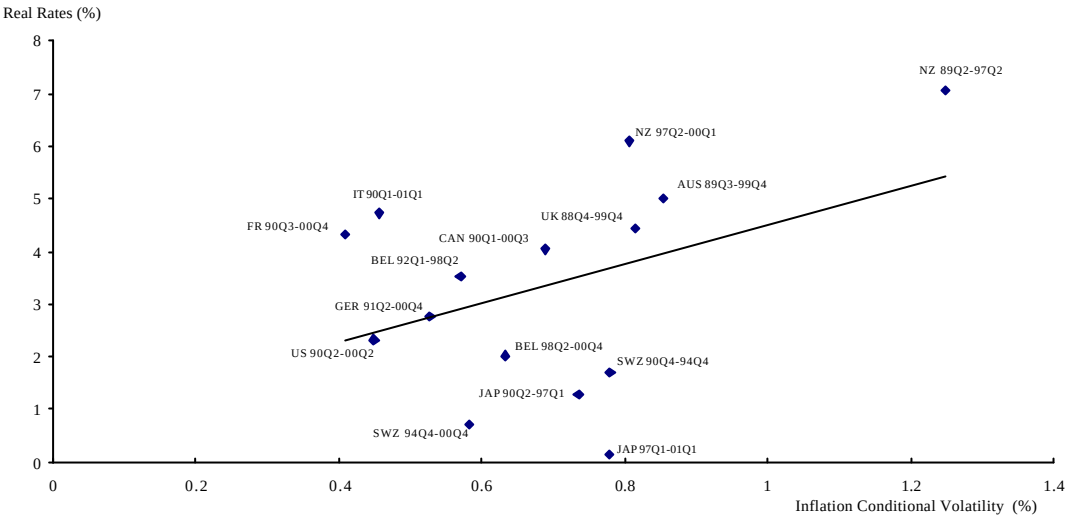
Source: Various. See table 1 for definition of cycle (peak to peak)

Table 1: The timing of the cycles (peaks) used in Charts 1 and 2

	Dates of cycle (peak to peak)	Average real rates	Average inflation	Average inflation volatility	Dates of cycle (peak to peak)	Average real rates	Average inflation	Average inflation volatility
Australia	89Q3 - 99Q4	4.99	2.76	0.85				
Canada	90Q1 - 00Q3	4.03	2.23	0.69				
Belgium	92Q1 - 98Q2	3.53	2.05	0.57	98Q2 - 00Q4	2.01	1.61	0.63
France	90Q3 - 00Q4	4.33	1.80	0.41				
Germany	91Q2 - 00Q4	2.74	2.47	0.53				
Italy	90Q1 - 01Q1	4.72	3.88	0.46				
Japan	90Q2 - 97Q1	1.27	1.33	0.74	97Q1 - 01Q1	0.15	0.30	0.78
New Zealand	89Q2 - 97Q2	7.04	3.06	1.25	97Q2 - 00Q1	6.08	0.77	0.81
Switzerland	90Q4 - 94Q4	1.70	3.66	0.78	94Q4 - 00Q4	0.70	0.91	0.58
US	90Q2 - 00Q2	2.33	2.97	0.45				
UK	88Q4 - 99Q4	4.42	4.14	0.81				

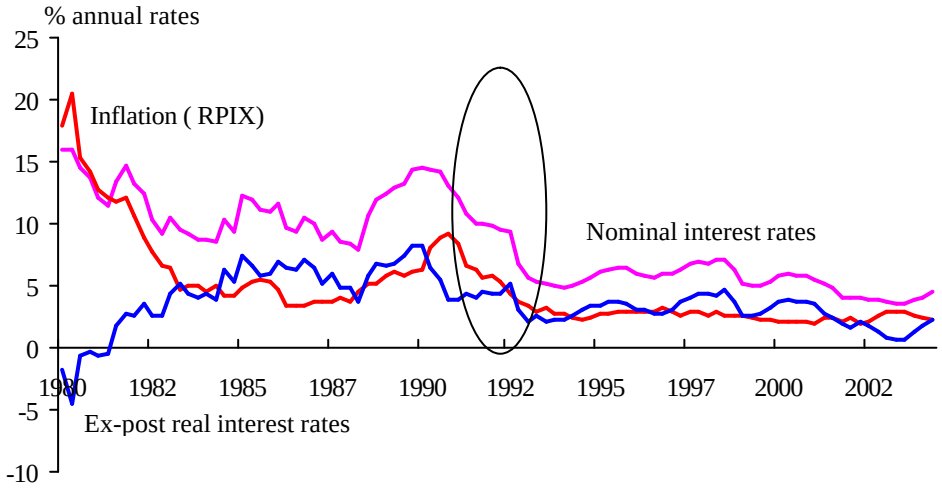
Note:The cyclical peaks were identified by applying a Hodrick-Prescott filter to GDP data as of June 2002.The results are not sensitive to alternative specifications of the cycle.

Chart 2: Real interest rates and inflation volatility over the cycle, 1990s



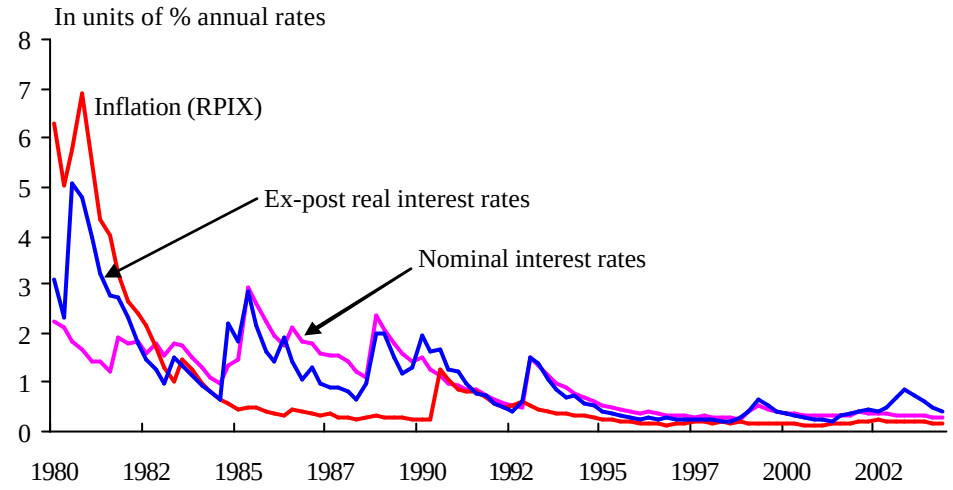
Source: Various. See table 1 for definition of cycle (peak to peak)
Notes
1. The conditional volatility was calculated from a time series equation for each country with the acceleration in inflation regressed on a constant, lagged inflation and a time trend. The errors followed a GARCH(1,1) process.

Chart 3: Inflation, nominal interest rate and ex-post real rates for the UK



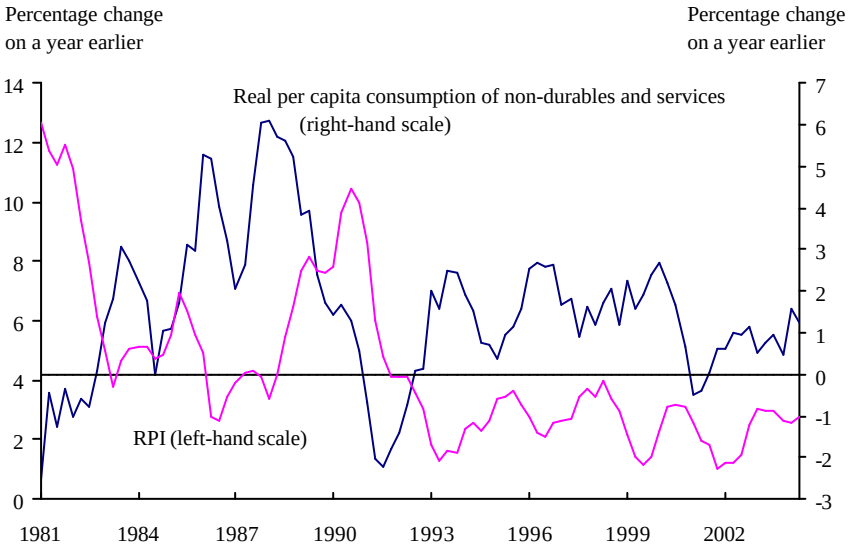
Source: IFS and ONS. The treasury bill rates are annualised quarterly averages of bills of three month maturity. Inflation is the quarterly average of the annual rate.

Chart 4: Conditional volatilities of inflation, nominal interest rate and the ex-post real rate for the UK



Notes: The conditional volatility was calculated from integrated GARCH (1,1) processes for each of the three series for a sample 1977Q1 to 2004Q2. We are grateful to Luca Benati for doing these calculations for us.

Chart 5: Consumption and inflation



Source: ONS

ENDS