



BANK OF ENGLAND

# Speech

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## Monetary Policy and the Exchange Rate

Speech given by

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At the Agricultural Engineers Association

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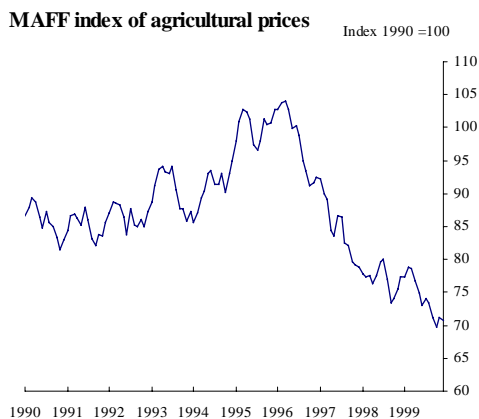
## Introduction

Mr President, it is a great honour to be invited to speak at this conference celebrating the 125<sup>th</sup> anniversary of your Association, and I would first like to express my thanks, and those of the Bank, for the opportunity to do so.

When your Association was founded in 1875, between a fifth and a quarter of the British workforce was in agriculture. Now that figure is about 2%, though with many more people dependent on agriculture within rural communities and supplying industries. The long-run decrease in the proportion of the population in agriculture is in part a reflection of positive factors—the productivity gains that have been achieved in farming and the fact that, as incomes have risen generally, a smaller share of income needs to be spent on agricultural products. More, however, is spent on other activities served by members of your Association—for example outdoor and sports activities such as golf. But since the Monetary Policy Committee is said to possess just one golf club, I am not sure that we are very good customers.

The last few years, however, have been marked by a severe combination of negative factors for agriculture and its supplying industries, especially those in manufacturing. Agricultural prices have been very depressed globally. Acute pressures have resulted from the BSE crisis. And the exchange rate, which rose more than 20% from mid-1996 to mid-1997, has since strengthened further, particularly in relation to the euro. All in all the MAFF index of agricultural prices has fallen by around 30% since mid-1996—see Chart 1.

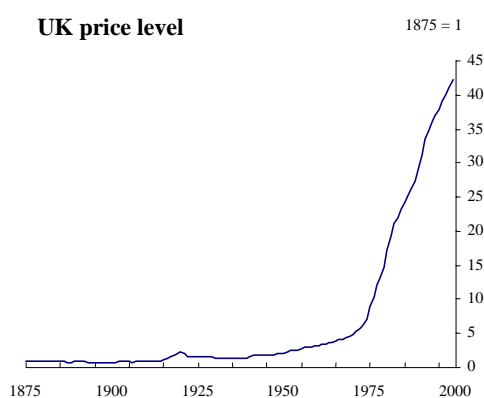
**Chart 1**



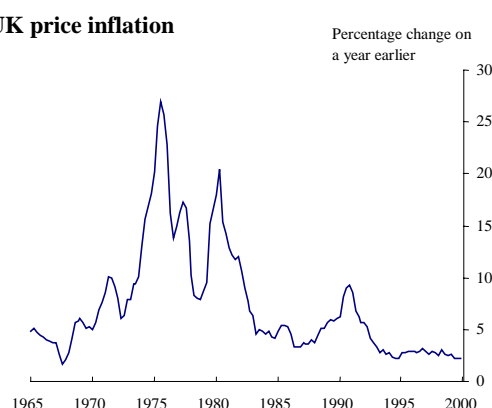
It is the exchange rate, and its relation to monetary policy, that I would like to discuss today. The success, or otherwise, of monetary policy should be judged by the record of price stability, for it is by securing and maintaining price stability that monetary policy can best make its contribution to conditions for economic success more generally.

You will see from Chart 2 that Britain's record of price stability since 1875 is decidedly mixed. Over 125 years the price level, as best we can measure it, has risen more than 40-fold. In the inflation generation from 1967-92, the price level rose more than eight-fold in the space of 25 years—an average annual inflation rate of around 9%—see Chart 3. Inflation then was volatile as well as high, and so too were interest rates and hence borrowing costs. The long-run decline in sterling's exchange rate over the same period—see Chart 4—is in large part a reflection of the UK's relatively poor inflation record.

**Chart 2**



**Chart 3**



But the inflation record more recently has been rather different. After sterling left the European Exchange Rate Mechanism in the autumn of 1992, inflation targeting was adopted as the framework for UK monetary policy. Previous frameworks based on monetary targets and exchange rate targets had not proved to be entirely successful or sustainable. Since June 1997, interest rates have been set by the Bank of England's Monetary Policy Committee. Our paramount objective, set by Government, is the 2½% target for inflation.

**Chart 4**

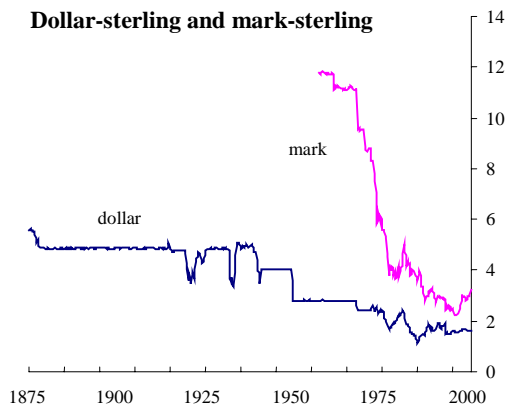
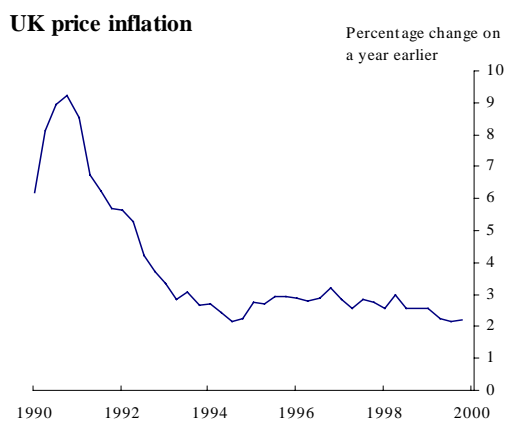


Chart 5 shows that, since 1993, annual inflation (on the RPIX measure) has averaged 2.7% and has stayed within a range from 2% to 3½%. Short-term interest rates have also been lower—between 5% and 7½%—and less variable than for many years, and long-term rates have declined very substantially. Moreover, growth in the economy *as a whole* has been reasonably strong and stable by comparison with the past, and unemployment has fallen to 20-year lows. The period of inflation targeting has been a period of good macroeconomic performance.

**Chart 5**



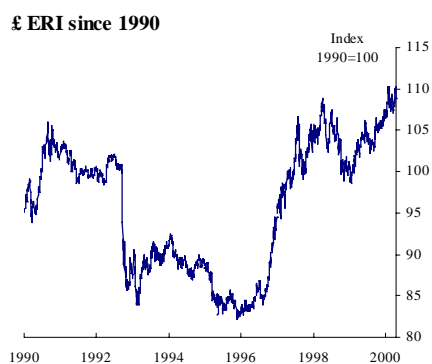
### The exchange rate: four questions

What has *not* been stable over this period, as you know all too well, is the exchange rate—see Chart 6—in particular the exchange rate against the euro and its predecessor

currencies. I propose to address the rest of my remarks today to four questions about monetary policy and the exchange rate:

- How does the exchange rate affect monetary policy?
- How does monetary policy affect the exchange rate?
- Why has sterling been so strong?
- Where is sterling heading?

#### Chart 6



*How does the exchange rate affect monetary policy?*

As stated above, the paramount objective of monetary policy is price stability as defined by the inflation target. The exchange rate is not an *objective* of monetary policy.

Monetary policy has one main instrument—the short-term official interest rate—and must therefore have one paramount objective. One instrument cannot achieve more than one target. The exchange rate is however a major factor in the setting of monetary policy to achieve the inflation target, especially in an economy so open to international trade as the UK.

The exchange rate affects inflation via two main channels:

- The price channel—higher sterling makes imports cheaper
- The demand channel—higher sterling tends to reduce export demand and increase import penetration, thereby reducing pressure of overall demand on supply capacity in the economy, and hence inflationary pressure (e.g. in the labour market).

The strength of sterling, together with the weakness of world demand following the financial crises of 1997-8, has dampened inflation via these channels in the past few years, and the UK's trade position has deteriorated considerably. Even so, inflation has not been far below target, indicating that domestic inflationary pressures have needed to moderate.

But there is no automatic link from the exchange rate to monetary policy. One cannot simply say that the exchange rate does this or that to inflation without considering the causes of movements in the exchange rate. So if asked 'Would interest rates have been higher if sterling had been weaker?', it is correct but not completely helpful to say 'Yes, other things being equal'. Other things rarely are. For example, if, as some feared, the UK economy had spent 1999 in recession—rather than growing by 3% over the year—then it is quite possible that sterling *and* interest rates would have been lower.

*How does monetary policy affect the exchange rate?*

Here we need to distinguish between

- the exchange rate in the everyday sense of the term—e.g. dollars per pound—the *nominal* exchange rate, and
- the *real* exchange rate—the exchange rate adjusted for differences in price or cost levels between countries—which is what matters for business competitiveness in international markets.

Over time, countries with looser monetary policies than others tend to have falling nominal exchange rates and higher inflation rates. As we saw earlier, this was the UK experience over most of the past few decades. The higher inflation means that the real exchange rate does not decline with the nominal exchange rate. For business, higher costs offset the exchange rate fall. Loose monetary policy, far from helping business, brings with it the costs—of uncertainty, instability and arbitrary shifts in wealth—that go with high and variable inflation.

In the short run, however, the exchange rate can shift for all sorts of reasons, some of them at times frankly inexplicable. Other things being equal (again), tighter monetary policy tends to go with a stronger exchange rate. Loosely speaking (but with major

qualifications discussed below), higher interest rate currencies will tend to attract investment funds to the point where the currencies reach a point from which they are expected to decline in such a way as to offset their interest rate premium. Only then are expected investor returns across currencies equalized. It follows, for example, that in a country with credible monetary policy, if signs of inflationary pressure appear, market interest rates and the exchange rate may go up together.

For very short maturities (e.g. a week or two), market interest rates move fairly closely in line with the official interest rate set by the MPC. But that is not so beyond the very short term, because market interest rates reflect, among other things, expectations of *future* official rates. MPC interest rate decisions, if anticipated, should not by themselves much affect market interest rates or exchange rates. Neither is it always clear how unanticipated decisions affect the markets. For example, if the MPC had not tightened policy pre-emptively since last September, the market might now be expecting higher *future* official interest rates than it now does, and this would be reflected in market interest and exchange rates. And when the MPC cut interest rates by 2½% between the autumn of 1998 and the summer of 1999, sterling strengthened rather than weakened against the euro.

It follows that a policy of cutting interest rates in an attempt to get sterling down would have no guarantee of achieving its aim. Sterling might decline if the MPC was thought, contrary to its statutory duty, to be aiming for inflation above target. But inflation, including inflation of business costs, would then rise. Any temporary relief that such a decline in sterling might bring to those most exposed to international competition would be fleeting, and all would lose from the resulting price instability. We have been there before.

*Why has sterling been so strong?*

Much, but not all, of this question involves the counterpart: Why has the euro been so weak? This is because, while sterling has been so strong since mid-1996 against the euro area currencies, it has been broadly stable against the dollar.

I know of no convincing explanation of the extent of sterling's strength. There are several possible candidate explanations. The first, which must carry some weight, has

to do with relative positions in the economic cycle. The UK has enjoyed stronger growth and lower unemployment than most of the euro area, which is a good deal of the reason for the current short-term (but not long-term) interest rate differential between sterling and euro. But cyclical differences, as reflected in interest rate differentials, cannot explain the degree to which sterling has risen against the euro, especially in recent months as the euro area economy has been recovering.

Second, it could be that the real exchange rate consistent with a sustainable current account position over time has risen. This could happen if, for example, international demand shifted in favour of goods and services (perhaps relating to information and communications technology) that the UK is thought to be good at producing. Maybe, but such effects do not yet leap out of the UK trade statistics, and while one hopes that the UK is well placed to benefit from ICT developments, their prospective effects seem unlikely to be so very asymmetrical among European countries.

Third, risk factors could have shifted. A currency perceived to be persistently prone to inflation risk and other kinds of macroeconomic instability is likely to be less appealing to risk-averse investors than a currency perceived as being better supported by credible macroeconomic arrangements focussed on economic stability. It is possible that, for such reasons and others, sentiment towards sterling may have shifted since the period when UK inflation was high and volatile, and when a policy regime for price stability seemed elusive.

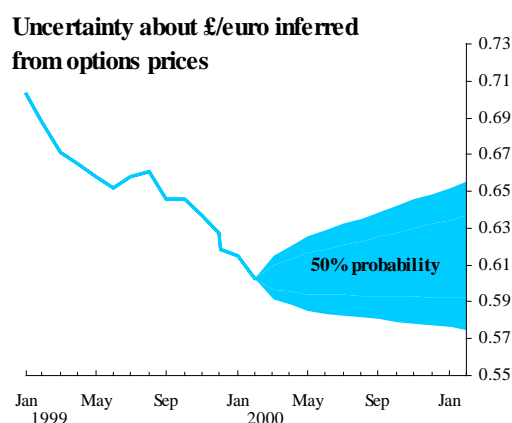
Finally, one cannot exclude the possibility that sterling is simply overvalued—that it has over recent years been exaggeratedly strong, and the euro unduly weak, relative to what can be plausibly explained by relative cyclical positions, the longer-run economic fundamentals, or attitudes to currency risk. This is not inconsistent with the possibility that sterling was to some degree undervalued before its sharp appreciation in 1996.



## Where is sterling heading?

The first thing to note when addressing this question is the volatility of floating exchange rates, and the correspondingly large uncertainty about the exchange rate outlook. One way to gauge this uncertainty is to use exchange rate options prices.<sup>1</sup> Chart 7 shows prospects for the sterling/euro exchange rate that can be inferred from options prices, on the assumption (which I shall question later) that investors are indifferent to risk. The chart shows the position at the close of business on Thursday 13 April, when the euro stood at 60.25 pence. The inferred central estimate of the market's expectation of the euro rate one year hence was about 61.5 pence—i.e. a euro appreciation of about 2%, in line with one-year interest rate differentials. The chart is drawn so that there is an even chance of the exchange rate being in the shaded area. The shaded area is quite large—at the one-year horizon it is 8 pence wide, or about 13% of the current exchange rate level. And remember that, according to this method, there is a 50% chance of the exchange rate being *outside* the shaded area at that point. Moreover, uncertainty gets even larger at longer horizons.

**Chart 7**



Some implications of this uncertainty are:

- that no reasonable person can be confident about where the exchange rate is heading
- that people can very reasonably disagree about the chances of different exchange rate paths occurring (and MPC members do)
- that short (even medium) runs of data cannot readily prove or disprove hypotheses about exchange rate behaviour.

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<sup>1</sup> The technique used to derive the chart from options prices is available on request.

A very natural hypothesis about exchange rate behaviour is what I shall here call the Simple Interest Differential theory (SID for short).<sup>2</sup> This says that exchange rates on average move to offset interest rate differentials. So if one-year sterling deposits pay 2% more interest than comparable euro deposits, then on average sterling will, according to SID, depreciate by 2% against the euro over the year. Uncertainty means that the ‘average’ outcome will almost certainly not occur, but it is still a useful benchmark case amid the volatility. SID is natural because it implies that investments in sterling deposits will, on average, do just as well as investments in euro deposits, and vice versa. SID will hold if market investors form their expectations rationally and are indifferent to risk.

The facts, however, appear resoundingly to contradict SID as a theory of average short-to-medium run exchange rate behaviour over the past (though the theory appears to fare better in relation to longer run behaviour.) I have heard SID likened to Tom, the cat in *Tom and Jerry*. Tom, you will recall, is regularly flattened by sledgehammers, falling trees, steamrollers, agricultural equipment, etc., only to pop back into shape with an ever-more determined frown. SID seems similarly irrepressible, and the contrast between the intuitive appeal of SID and its apparent disagreement with past facts is one of the great puzzles of financial economics.

Ways out of the puzzle include the possibilities that:

- that markets are irrational
- that currency risk factors matter for investors.

As to the first possibility, I am certainly not wedded to the notion that markets are always rational. For example, it seems entirely possible for some financial market prices to move appreciably adrift from whatever may be their ‘fundamental’ values.

But what is the fundamental value of sterling consistent with a sustainable current account position over time? Nobody knows, but most of the substantial body of

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<sup>2</sup> The attached Annex provides more detail on the discussion that follows. SID is equivalent to the theory of uncovered interest parity (UIP) with risk neutrality.

empirical analysis on this question suggests that sterling is at present stronger than is justified by consideration of the underlying economic fundamentals.

Some might say that the ‘fundamentals’ are of doubtful practical relevance, and that we should instead seek to explain where supposedly irrational markets are headed in the medium term. Maybe, but I doubt my ability—at least relative to the well-financed talent already engaged in it—at this branch of social anthropology.

The way that SID fails suggests at face value that currencies whose interest rates relative to others are higher than (or not as low as) they have been on average in the past tend on the whole to be a good investment. The studies on this are no secret, so why does the seemingly good investment opportunity not get grabbed and therefore vanish?

Maybe that has happened, in which case the past is no guide to the future. If it has not, perhaps the reason has to do with risk, rather than market irrationality. There is nothing irrational about avoiding risk, or requiring a high average return to bear it. If, for the reasons discussed above, sterling had become a relatively low risk currency in the view of the market—and maybe it has—it would follow that sterling was more likely than not to decline from now on by at least as much as interest rate differentials.

## **Conclusion**

Where has this excursion into exchange rate economics got us? It certainly has not yielded a confident view of where sterling is headed. A confident view of exchange rate prospects is not a view you should take seriously. But I think it has offered some reasons to think that a decline in sterling in due course is odds on rather than odds against, though again I would stress the uncertainty. The reasons are three—interest rate differentials, risk factors, and a view that sterling is probably higher than is warranted by the economic fundamentals.

A decline in sterling and a recovery in the euro would help ease some of the current imbalances of activity within the UK economy. Those imbalances are clearly evident from the severe pressures being confronted in agriculture, in much of manufacturing, and also in parts of the service sector. Those pressures, and business conditions

throughout the economy generally, are very much part of the information and analysis that goes into the setting of monetary policy. Likewise, the exchange rate is a central part of the MPC's assessment of inflation prospects.

The goal of monetary policy, like money itself, must relate to the economy as a whole. Monetary policy now has the clear goal of price stability as defined by the inflation target. Only when inflation is low and stable are the economic decisions of businesses and households free from inflation distortion. Over recent years, unlike in the past, the UK has had low and stable inflation, and with it has gone a period of quite strong performance in the economy as a whole.

Those involved with monetary policy always stress that nothing is certain. But it seems safe to predict that none (few?) of us will be present at your 250<sup>th</sup> anniversary conference in 2125. If your successors again see fit to invite an economist to speak at it, I hope they will be able to report on an era of not just good overall economic performance but also widely shared economic prosperity. It is not in the power of monetary policy to guarantee that. What successful monetary policy can do is to keep inflation low and stable. That is not an end in itself but it is how monetary policy can make its best contribution to conditions for good economic performance in the future.

## MONETARY POLICY AND THE EXCHANGE RATE: ANNEX

This annex seeks to give some more detail on the remarks in the speech about exchange rate movements and interest rate differentials, and to point to some references in the economics literature.

The simple interest differential (SID) hypothesis implies that agents expect the exchange rate to appreciate/depreciate in line with interest rate differentials. In symbols,

$$E_t s_{t+1} - s_t = i_t^* - i_t \quad (1)$$

where  $s$  is the (log of the) nominal spot exchange rate (an increase is an appreciation) and  $E_t s_{t+1}$  denotes the expected value of  $s$  at time  $t+1$  given information available to agents at date  $t$ . The one-period domestic nominal interest rate is  $i$  and the foreign interest rate is  $i^*$ .<sup>3</sup>

As discussed in the main text, the volatility of exchange rates means that the actual change in the exchange rate will hardly ever be exactly equal to the interest rate differential. But according to SID the change in the exchange rate should *on average* be equal to the interest rate differential. One way to test this is to regress nominal interest rate differentials on actual nominal exchange rate changes in an equation of the form:

$$s_t - s_{t-1} = \alpha + \beta(i_{t-1}^* - i_{t-1}) + u_t \quad (2)$$

where  $\alpha$  and  $\beta$  are coefficients and  $u_t$  is a residual. If the SID hypothesis holds, then  $\alpha = 0$  and  $\beta = 1$ .

A wealth of research has produced evidence against the SID hypothesis. In a survey of 75 published estimates, Froot and Thaler (1990) found an average estimate of  $\beta$  of *minus* 0.88. Similarly, a regression of (2) for the sterling-dollar exchange rate over the 1976-1998 period yields an estimate of  $\beta = -0.70$  (see Wadhvani (1999, page 51)).

The evidence is not universally against SID. Most studies have considered exchange rate movements at a relatively short horizon (less than two years). The results of Meredith and Chinn (1998) suggest that the horizon may matter: they find more evidence for SID at the five- and ten-year horizon than at the one-year horizon.<sup>4</sup> Nevertheless, the bulk of the evidence suggests that  $\beta$  is considerably less than one. This goes decidedly against SID. This puzzle is known as the ‘forward discount puzzle’.

Does the apparent failure of exchange rate movements to conform to SID mean that high interest rate currencies are on average a profitable investment? As Cochrane (1999, page 25) has emphasized, the implications of the forward discount puzzle are not so straightforward:

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<sup>3</sup> Equation (1) generalises to any horizon (for example, the expected depreciation of the nominal exchange rate over the next two years is equal to the difference in two-year nominal interest rates at home and abroad).

<sup>4</sup> Ironically, Meredith and Chinn (1998) also find evidence for the SID hypothesis for the dollar-sterling exchange rate at *short* horizons. For the 1989-1998 period their estimates of  $\beta$  are close to 1 at the three-, six- and twelve-month horizons. See Meredith and Chinn (1998, Table 2, page 25).

“the puzzle does *not* say that one earns more by holding bonds from countries with higher interest rates than others. Average inflation, depreciation, and interest rate differentials line up as they should. The puzzle *does* say that one earns more by holding bonds from countries whose interest rates are *higher than usual* relative to U.S. interest rates (and vice versa)”.

In fact UK interest rates are now lower relative to US interest rates than they have been on average over the past twenty-five years.

The SID hypothesis is based on the combined assumption that market participants (a) form their expectations rationally, and (b) do not care about risk. If SID is false, it could be (a) or (b) or both that is wrong.

If it is (b) that is wrong, then the problem with SID has to do with ignoring risk rather than with the general theory of interest rate differentials. Indeed it seems intuitively very plausible that currency risk factors do matter. But how could they explain the large body of empirical findings outlined above? In other words, can the facts be squared with what one might call ‘risk-adjusted interest differential theory’ (RAID as distinct from SID)?

If investors care about currency risks and hence require compensation for taking them, then equation (1) can be rewritten as:

$$E_t s_{t+1} - s_t = i_t^* - i_t + \rho_t, \quad (3)$$

where  $\rho$  is the ‘foreign exchange risk premium’, which is assumed to vary unpredictably over time. McCallum (1994) shows that if, as is the case in practice, policy makers take the exchange rate into account when setting interest rates, then econometric estimates of  $\beta$  in equation (2) may be biased downwards.

To see how this could be so, suppose that the risk premium  $\rho$  falls unexpectedly. Other things being equal, the current spot exchange rate  $s$  will rise. This will happen because, thanks to the lower risk premium, the exchange rate will be expected to depreciate henceforth (i.e. from the new higher level) to a greater extent than before the risk premium fell.

Now consider the response of monetary policy. If the stronger exchange rate dampens prospective demand and inflation, then monetary policy will tend to be loosened (relative to what would have happened in the absence of the fall in the risk premium).

This kind of policy response shows how lower-than-usual interest rates and more-than-usual currency depreciation can sometimes partly go together. This combination would make little sense if risk factors did not matter, because a profitable investment opportunity would be going begging. But if they do matter, and with monetary policy reacting in part to the exchange rate, the persuasive evidence against *simple* interest rate differential theory might not refute wider interest rate differential theories that allow for currency risks. (Theories along these lines can also be squared with the evidence mentioned above that SID does less badly at longer horizons than shorter horizons.)

The general lesson is summed up Walsh (1998, page 254):

“This example illustrates an important point: the empirical correlations between economic variables may depend critically on the manner in which policy is being conducted.”

Unfortunately, however, this appeal to currency risk factors is merely a *possible* solution to the forward discount puzzle. To fit the past facts it appears to require risk premia that are rather large and volatile relative to other uncertainties—see Engel (1996, pages 124-127). And appeals to the unobservable are never entirely satisfactory. Despite intense recent research, a good empirical model of the currency risk premium remains elusive.

Two key points still stand. First, care is needed in interpreting empirical correlations involving asset prices, especially since monetary policy is endogenous. Second, considerations of risk may play an important role in exchange rate economics just as they do in asset price economics more generally.

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