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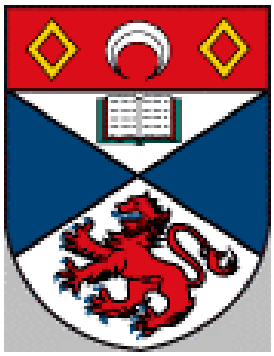

The Cost of Political Intervention in Monetary Policy

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The cost of political intervention in monetary policy

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Abstract
Data from a unique monetary 'experiment' conducted in the UK during the period 1994-97 are used to investigate the cost of political intervention in monetary policy. The paper finds that the difference between government bond yields in Germany (but not the US) and the UK was systematically related to an index of the credibility of monetary policy constructed on the basis of the frequency of agreements/ disagreements between the Minister of Finance who took the decisions on interest rates and the Bank of England, whose recommendations were published with a lag, with disagreements causing an increase in the yield differential.

JEL classification: E5

Keywords: monetary policy, time-inconsistency, credibility

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The idea that political control of monetary policy has potentially adverse consequences can be dated back at least to Simons (1936). It has played an important role more recently both in the literature on the time inconsistency of policy (initiated by Kydland and Prescott, 1977) and in the literature on central bank independence (CBI) (e.g. Grilli, Masciandaro and Tabellini, 1991; Cukierman, 1992). However, to our knowledge there have been no direct estimates of the adverse consequences of political intervention in monetary policy.

In this paper we use data from a unique monetary 'experiment' conducted in the UK during the period 1994-97 to investigate the cost of such intervention. Section 1 sets out the analytical framework and section 2 the empirical background, section 3 presents the empirical results, and section 4 concludes.

1 Analytical framework

In the original model of time-inconsistency due to Kydland and Prescott (1977) and in its development by Barro and Gordon (1983), there is an inflationary bias as the result of the fact that the policy-maker is assumed to have a target rate of output equal to the Walrasian equilibrium rate, whereas the natural rate, at which inflation is constant, is lower than the Walrasian equilibrium because of micro-level distortions and imperfections.[1] Formally, this can be presented in terms of a government loss function

$$L = \pi^2 + \beta(y-y^*)^2 \qquad [1]$$

and a 'surprise' supply function (short run Phillips curve):

$$y = \alpha(\pi - E\pi) + \varepsilon \qquad [2]$$

where π is the rate of inflation, β is the (relative) weight on output in the loss function, y is the deviation of output from the natural rate, $y^* > 0$ is the government's target level for y, that is the Walrasian equilibrium rate of output, α is the reciprocal

of the slope of the short run Phillips curve, $E\pi$ is the private sector's expected rate of inflation, and ε is a zero-mean white noise supply shock. The private sector forms its expectations before the shock is realised, but the government sets its policy in the light of the realised shock. The government minimises its loss function taking private sector expectations as given, but under rational expectations the private sector understands this and the equilibrium rate of inflation turns out to be

$$\pi = \alpha\beta y^* - \frac{\alpha\beta\varepsilon}{1+\alpha^2\beta} \qquad [3]$$

where the first term on the right hand side is the inflation bias and the second term is the unavoidable impact of the supply shock. This contrasts with the first best policy result, which can be obtained by setting $y^* = 0$, under which inflation is affected only by the shock term:

$$\pi = -\frac{\alpha\beta\varepsilon}{1+\alpha^2\beta} \qquad [4]$$

Note that the inflation bias is larger the flatter the Phillips curve, the higher the weight on output in the loss function, and the greater the extent to which the government's target level of output is above the natural rate.

The first CBI solution to the inflation bias problem was presented by Rogoff (1985) in his model of an inflation-averse central banker, whose loss function places a higher weight on inflation than that of the government. In the present framework that is a lower relative weight on output, i.e. a lower β, which makes the inflation bias term smaller. On the other hand a lower β makes the effect of shocks on inflation lower, and at the same time makes the variance of output higher.

Persson and Tabellini (1993) and Walsh (1995) explored the possibility that the government could require the central bank to pay a penalty which varies with

inflation if it misses the target inflation level of zero. In this case the loss function for the monetary authority becomes

$$L = \pi^2 + \beta(y-y^*)^2 - \gamma + \delta\pi \qquad [8]$$

where the penalty is $\gamma - \delta\pi$. Equilibrium inflation turns out to be

$$\pi = \alpha\beta y^* - \frac{\delta}{2} - \frac{\alpha\beta\varepsilon}{1+\alpha^2\beta} \qquad [9]$$

If the penalty is set such that $\delta = 2\alpha\beta y^*$, the inflation bias is exactly eliminated.

A somewhat different perspective has been taken more recently by Bean (1998), who rejects the 'social planner' explanation of why the government's target y^* is above the natural rate, that is the idea that y^* is the (optimal) Walrasian equilibrium rate, and argues that a more convincing view of the government's objectives is that, although they do not have a specific target for output, governments feel under electoral pressure to deliver (via the whole range of their policies) a high level of output. In addition, there is always doubt about the precise level of the natural rate of output (or unemployment) and governments often have over-optimistic views of the extent to which the country's economic performance has improved under their management; they are therefore inclined to take risks in over-stimulating the economy, especially near elections. This implies a loss function as follows:

$$L = \pi^2 + \beta y^2 - \zeta y$$

according to the last term of which the government wants output to be higher. Minimisation of this loss function in a context of rational expectations produces

$$\pi = \frac{\alpha\varsigma}{2} - \frac{\alpha\beta\varepsilon}{1+\alpha^2\beta} \qquad [10]$$

where the inflation bias is now $\alpha\zeta/2$, which varies positively with the extent to which the government 'cares' about the level of output ζ.

But as Bean points out, in this context the natural interpretation of central bank independence is that the central bank's loss function does not include the third term above in output since the independent central banker has no need to signal competence in this way and is therefore indifferent to the level (but not to the variance) of output: the central bank has a mandate to pursue price stability *tout court*. In this case its loss function is

$$L = \pi^2 + \beta y^2 \qquad [11]$$

and equilibrium inflation is

$$\pi = -\frac{\alpha\beta\varepsilon}{1+\alpha^2\beta} \qquad [12]$$

Thus, as Bean puts it (1998, p. 1799), "*it is the act of delegation itself that solves the time inconsistency problem*".

In each of these models of CBI as the solution to time-inconsistency, though perhaps most clearly in Bean's, it is the contribution to policy decisions made by the political authorities, as opposed to that made by the central bankers, which adversely affects both expectations of inflation and the equilibrium rate of inflation. An independent central bank delivers lower inflation than the political authorities in Rogoff (1985) because it is more inflation-averse, while in Bean (1998) it delivers lower inflation because, unlike the political authorities, it is not aiming for an objective which is incompatible with zero (or constant) inflation.

2 Empirical background

Over the last 25 years, the UK has experienced a bewildering variety of monetary policy regimes. The authorities successively introduced targets for broad money (in 1976), abandoned them (formally in 1987), moved towards exchange rate targets with

an informal peg to the Deutschemark (between March 1987 and March 1988), adopted a formal exchange rate target by entering the ERM in October 1990, and then after the UK's ignominious exit from the ERM in 1992 adopted the new monetary policy framework which we investigate here – a combination of inflation targeting and a new relationship between central bank and finance ministry. Finally in May 1997 the new government gave the Bank of England control of interest rates, with a mandate to pursue an inflation target set by the government.

Between January 1994 and May 1997, monetary policy in the UK was meant to be pursuing an inflation target set by the government,[2] and the Bank of England as central bank was required to offer its advice on interest rates to the Chancellor of the Exchequer (the UK minister of finance) in the forum of a regular monthly meeting. Interest rate decisions were taken by the Chancellor, who was not obliged to accept the Bank's advice and sometimes chose not to do so, but the Bank's advice to him would later be made public in the minutes of the monthly meeting.[3]

The financial markets were therefore able to see, with a certain time lag, whether the Chancellor was accepting the Bank's advice or whether he was rejecting it. Since the Bank of England had no reason to pursue any objective other than price stability as defined by the government's inflation target, it would have been reasonable for the financial markets to treat disagreements between the Chancellor and the Bank as *prima facie* evidence that the political authorities were pursuing some other objective; evidence of that kind could then be expected to lead to a fall in the credibility of monetary policy.

The minutes provide enough information to make possible a five-fold classification of the views of the Chancellor of the Exchequer and the Governor of the Bank of England. This classification, first developed in Cobham (1997), distinguishes

between five different possible views: unequivocal preference for a rise in the interest rate; a 'bias' towards a rise; no bias towards a rise or a cut; a 'bias' towards a cut; and unequivocal preference for a cut. The classification for each of the monthly meetings is given in Appendix I. Table 1 summarises the agreements and disagreements over the period under investigation; if there had been no disagreements all meetings would be classified along the diagonal, but as can be seen there were a significant number of disagreements (17 out of 41) and all the disagreements were to one side (the south-west) of the diagonal. If the disagreements had been the result purely of different interpretations of rather noisy signals, then there would have been disagreements on both sides of the diagonal. The fact that they were all on one side suggests that there may have been a difference between the Bank and the Chancellor in their policy objectives, with the Bank being systematically 'tougher'.

Figure 1 shows the course of interest rates over the period with those disagreements in which the interest rate was changed or not changed against the expressed wishes of the Bank indicated by the arrows. Interest rates had been cut on several occasions since the UK left the European Exchange Rate Mechanism on Black Wednesday (16 September 1992), and by January 1994 stood at 5.5%. The Chancellor made a further cut in February 1994, against the advice of the Governor who was more cautious about inflation and more confident about growth. By September growth was stronger and inflation still subdued, but the Chancellor and Governor agreed on a pre-emptive 0.5% rise, and this was repeated in December and February 1995. By May 1995 the Governor was worried by the fall in sterling and pressed for a further rise but the Chancellor, basing his judgment on "a broad assessment of the economic data, rather than market expectations",[4] argued that growth was now at a sustainable rate and played down the inflationary implications of the recent depreciation. The

Bank continued to press for rises in June and July, but was again rebuffed. Meanwhile new information came to suggest that growth was not excessive and inflation was not rising, and the Bank ceased to press for a rise. By the end of the year growth appeared to have slowed and the prospects for inflation had improved. Between December 1995 and June 1996 there were two agreed and two disagreed 0.25% cuts in interest rates. In September 1996 the Governor advised that the interest rate should be raised by a full 0.5%, but the Chancellor demurred. He agreed to a 0.25% rise in October, but the Bank continued to press for further rises in every month from December to April 1997. In the event, inflation on the official target measure just hit the 2.5% target at the time of the 1997 election (though this was not known until afterwards).[5]

As far as we know, there is no other example of such an institutional arrangement for decision-making in monetary policy, and it has now been discontinued in the UK. Central banks have had higher or lower degrees of independence, but typically for those whose independence is incomplete the discussions between the central bankers and the political authorities are not publicly known, or at least not in detail. For those which are largely independent, on the other hand, the political authorities may press their views on the central bank, but they do so largely in private and they do not take the decisions on interest rates.

In this paper we present a test of the proposition that visible political intervention against the preferences of the central bank weakens the credibility of monetary policy. We formulate this proposition in the form of the hypothesis that the evidence on agreements and disagreements between the Chancellor and the Bank, as captured in an *ex ante* index of credibility (explained in the next section), affected the *ex post* credibility of policy as measured by the long term interest differential between the UK and either Germany or the US.[6]

Long term nominal bond yields can be thought of as consisting of four elements: the expected real rate of return, the real rate risk premium, the expected inflation rate over the relevant time horizon, and the inflation risk premium. With respect to the differential between UK and German or US yields we assume that, given capital mobility (and significant economic integration), the first two of these elements are common to the three countries, and the last two elements together comprise a measure of the credibility of monetary policy. Further, we assume that because of their strong independence and established reputations the Bundesbank and the Federal Reserve are expected by the financial markets to generate what amounts to price stability. In that case the long term yields in Germany and the US can be treated as benchmarks of high credibility, and we can treat the differential as an *ex post* measure of the credibility of UK monetary policy.[7]

Clarida, Galí and Gertler (1998) modelled UK monetary policy in the 1980s in relation to Germany as the anchor currency of the exchange rate mechanism of the European Monetary System, but Adam, Cobham and Girardin (2001) have shown that UK monetary policy was influenced in the period considered here as much by US as by German (short term) interest rates, and Artis and Zhang (e.g. 1999) have shown that the UK business cycle has been much closer to that of the US. In this paper we therefore consider the long term interest differentials between the UK and both Germany and the US.

3 Data and cointegration analysis: the UK-German differential

Our data set for the empirical investigation comprised monthly data for the period January 1994 to May 1997. This is a short sample, and it is not clear whether stationarity tests are appropriate and efficient here. In addition, it is obvious that over

the long run the variables concerned - a credibility index which is bounded between 0 and 1 and the interest differential between the UK and Germany - are very likely to be stationary. However, in order to be sure that we are not picking up any spurious correlation between the variables, we have chosen to carry out a full analysis with unit root and then cointegration tests.

The *ex ante* credibility index $CRED_t$ was constructed on the interval [0,1] on the basis of the classification of the views of both the Chancellor and the Bank given in Appendix I. We assumed that at the beginning of the experiment the financial markets had no hard information as to whether policy was seriously pursuing the inflation target or not, so the initial value of the index was set at 0.5.[8] In subsequent periods the index adjusts upwards or downwards in the light of the evidence of agreements or disagreements, according to the following formula:

$$CRED_t = \gamma CRED_{t-1} + (1-\gamma)D_t,\ 0 < \gamma < 1$$

where $CRED_t$ is the *ex ante* index of credibility and D takes the value of 0 for a disagreement and 1 for an agreement in the meeting of the current month.[9] The magnitude of γ indicates the inertia, and that of $(1 - \gamma)$ the speed, with which credibility adjusts in the light of the latest information on agreements/disagreements between Chancellor and Bank.

This index is *ad hoc*, but it has some desirable properties in this context. First, the index exhibits persistence: its value in any period is conditioned by its value in the previous period, and it adjusts only gradually away from that as contrary evidence accumulates. Secondly, the index is asymptotic to its extreme bounds (of 0 and 1): for successive agreements (disagreements) the rise (fall) in the index gets progressively smaller. Alternatively, agreements (disagreements) which are 'against the run of play'[10] have a larger impact on the index. In a situation where there is scope for

Chancellor and Bank to disagree about the interpretation of the noisy signals from the economy as well as about underlying objectives, it seems plausible that the financial markets would react in this way rather than, say, credibility collapsing to zero as soon as one disagreement occurs (as in Backus and Driffill, 1985) or credibility collapsing to zero but for one period only (as in Barro and Gordon, 1983).[11]

The interest rate differential which we considered first was defined as the difference between the UK long-term government interest rate and the German long-term government interest rate, IRDIFUKGE. The data are yields on 10-year government bonds on the last day of the calendar month, as supplied by the Deutsche Bundesbank. Figure 2 shows the course of both the interest differential and the credibility index (with the value for γ chosen as below) over the period.

The first step of the empirical investigation was to identify the order of IRDIFUKGE and CRED over the sample period by carrying out Dickey-Fuller and Augmented Dickey-Fuller (ADF) tests, which were run for a range of values of the adjustment parameter γ in CRED. In every case the variables were identified as I(1) processes for this sample period. The results are available on request.

Next, in order to choose a value for the parameter γ in the credibility index, we ran a series of simple regressions with the UK-German interest rate differential, IRDIFUKGE, as the dependent variable and various measures of the credibility index, CRED (each using a different value of γ), as the independent variable. As Table 2 shows, the equation which maximises the R^2 and minimises the sum of squared residuals is that for $\gamma = 0.75$. Thus in what follows the CRED measure which is used is that for $\gamma = 0.75$.

For estimation purposes the methodology of Hendry and Mizon (1993) was followed, and the module of PcFiml as developed by Doornik and Hendry (1997) was used.

We started with a 4 lags VAR, but were able to establish the adequacy of 3 lags through the use of likelihood ratio tests and the Akaike Information Criterion. In the 3 lag VAR, as Table 3 shows, all the residual correlations are low and the companion matrix of the dynamics has no eigenvalues on or outside the unit root circle. Summary statistics and diagnostics on both the individual equations and the VAR as a whole suggest that the residuals are white noise while ARCH and heteroskedasticity tests imply the absence of misspecification. Gonzalo (1994) has pointed out that the absence of normality does not affect either the number of cointegration vectors or the coefficients obtained through the application of the Johansen (1988) technique.

Table 4 reports the results of maximum eigenvalue, $T\log(1-\lambda)$, and trace statistic, $T\Sigma\log(1-\lambda)$, tests which imply that the UK-German interest rate differential and credibility are cointegrated. The next step in the empirical investigation was to test jointly for the existence of a cointegrating vector and long-run weak exogeneity of the credibility variable for the parameters in the interest rate differential equation. This implies a single row in the β' matrix and a single column in the α matrix of the form (*, 0). The results are presented in Table 5. The restrictions are data acceptable. The normalised coefficients of the cointegrating vector have acceptable signs while the loading coefficient is, as expected, negative. Thus, the estimated cointegrating vector can be interpreted as the long run equation

IRDIFUKGE = -0.39 CRED.

In other words, there existed an inverse long run relationship between the two variables, which suggests that the credibility of UK monetary policy was systematically related to the agreements/disagreements between the Bank of England and the Chancellor.

Next, we mapped the data to I(0) space. The results are presented in Table 6. The individual equation diagnostic tests indicate that the residuals in this parsimonious VAR are white noise and normally distributed, and that there are no problems of arch and heteroskedasticity. The same table reports the coefficients on the ECMs in both equations and it may be noted that the coefficient in the credibility equation is insignificant. It follows then that the weak exogeneity conclusion is confirmed, which permits the inclusion of contemporaneous observations of the weakly exogenous variable CRED in the estimation of a conditional interest rate differential equation. Finally, the preferred specification of the error correction formulation of the long run interest rate differential equation is that presented in Table 7. All the diagnostic tests are satisfied and the implication is that the estimated equation is a reasonably data coherent representation. The relatively large value of the coefficient on the error correction term, 0.21, indicates that the speed of adjustment to equilibrium is relatively fast.

4 The UK-US differential

We then proceeded to investigate the existence of a systematic relationship between the UK-US interest rate differential IRDIFUKUS and credibility, using the same procedures as those used for the UK-German differential.[12] The preferred value for γ was 0.98, but the eigenvalue test and trace test results shown in Table 8 indicated that

there was no cointegrating relationship between the IRDIFUKUS and our *ex ante* measure of credibility.

To investigate this somewhat surprising result it is useful to examine the data for the UK, US and German yields, as graphed in Figure 3. All three show similar medium run trends - a sharp rise in 1994, followed by a gentle decline with a further rise in early 1996 – which reflect the common international element in changing perceptions of the prospects for economic growth and inflation. However, the US yield is notably more volatile than the German yield, and this could explain the econometric findings of a systematic relationship between credibility and the UK-German but not the UK-US yield differential.[13] The difference between the US and Germany is probably best understood in terms of the lack of a clear nominal anchor for monetary policy in the US under what has been called "a 'just do it' policy regime",[14] and the US's resulting greater exposure to what Goodfriend (1993) called 'inflation scares': in particular, Goodfriend (2001) has discussed the inflation scare of 1994, which he relates in part to the dispute arising from the Congress's objection to the Fed's preemptive interest rate rises from February 1994. By contrast the Deutsche Bundesbank had a formal commitment to monetary targeting which it used primarily as a framework for explaining policy decisions that were arguably based on something closer to inflation targeting.[15] Moreover, on conventional measures such as those of Grilli, Masciandaro and Tabellini (1991) and Cukierman (1992) the Bundesbank is a little more independent than the Federal Reserve Board.[16] This suggests that the US yield may have been relatively more influenced by country-specific factors than the German yield. It is also worth noting that, despite Artis and Zhang's (1999) findings on the greater correlation of the UK with the US business cycle over the period 1979-95, Angeloni and Dedola (1999) found that over the

shorter period 1992-97 a number of indicators for the UK, including real GDP and stock market indices, were more closely correlated with those in Germany than with those in the US.

5 Concluding comments

The empirical results presented in section 3 are consistent with the hypothesis formulated in section 2 that agreements and disagreements between the Chancellor and the Bank, as captured in an *ex ante* index of credibility, affected the *ex post* credibility of policy as measured by the long term interest differential between the UK and Germany.[17] These findings imply that the cost of political intervention in monetary policy was substantial. Indeed, a simulation of the estimated equation produces the result that, if there had been no disagreements between the Chancellor and the Bank of England throughout the period, the long term interest differential would have been 1.5% lower by April 1997 than it actually was, i.e. the interest rate would have been 6.11% as against the actual value of 7.61% (with the German rate then standing at 5.87%). The result that there was no systematic relationship between the UK-US differential and the credibility index, on the other hand, probably reflects differences in the operation of monetary policy and in other country-specific factors affecting yields in the US and Germany.

Finally, two particular qualifications should be noted. First, the cost of political intervention can be measured here only because the views of the central bank were published; but their very publication placed a constraint of some kind on the ability of the Chancellor to set interest rates in line with purely political considerations.[18] Thus the cost of political intervention in cases where no such

publication occurs but intervention is suspected in the markets may well be significantly higher.

Second, Cobham (1997) has drawn attention to some strategic considerations, which may have influenced the views of both players in this particular game. On occasions the Bank may have had an incentive to shade its views towards those of the Chancellor when the disagreement was small, in order to ensure that the shock of a future disagreement remained a serious threat to the Chancellor. The Chancellor, on the other hand, may have had an incentive to disagree with the Bank where the issue was a marginal one, in order to try to diminish the shock of a disagreement with the Bank and so increase his own room for manoeuvre. Insofar as these strategic incentives affected the views on interest rates expressed by the two sides, and insofar as that process was understood by the financial markets, the *ex ante* credibility of monetary policy would have been less directly related to the extent of the observed agreements and disagreements. However, to model this formally would be extremely complicated.[19] The fact that the basic hypothesis performs so well under the simpler procedure adopted here is surely indicative of its robustness.

NOTES

[1] Subsequent research (discussed in, for example, Cukierman, 1992, and Persson and Tabellini, 1997) has also put weight on other possible underlying causes of an inflationary bias, including the desire to finance government deficits more cheaply and political-electoral motives.

[2] The target was 1-4%, with inflation to be in the lower half of this range by the end of the Parliament (which meant no later than the spring of 1997). After May 1997 the target was set, and has continued to be set, at 2.5%.

[3] The official time lag for the publication of the minutes was about six weeks, but in many cases the basic information had already leaked into the public domain before then, for example as the result of comments made by the Governor of the Bank to the House of Commons Treasury Committee.

[4] Minutes of the Monthly Monetary Meeting, May 1995, paragraph 32.

[5] Inflation dipped down to 2.5% in April and May 1997, from 3.3% in November 1996 and 3.1% in January 1997, but rose again shortly after, reaching 3.0% in July 1997 and, after another dip, 3.2% in May 1998.

[6] The fact that the data period is so short means that it would not be useful to look at the outturn for inflation over the period, even if some subsequent period corresponding to the relevant lag was included.

[7] See King (1995) for an example of the use of the French-German long term yield differential in this way.

[8] The econometric work uses May 1994 as its start-date, partly because the decision to publish the minutes of the Monthly Monetary Meetings was taken only in April, when the minutes for the first three meetings were published, and partly to ensure that the

initial index number of 0.5 had been thoroughly 'digested' by the start-date for the estimation.

[9] We considered whether the disagreements could be further separated into 'large' and 'small' disagreements. But there was only one case (June 1996) where the Bank and the Chancellor were more than one class apart in terms of the classification of Table 1, and there was only one case (May 1995) where the Bank argued unequivocally for a ½% rather than a ¼% change.

[10] More precisely, agreements (disagreements) have a larger impact when the index is relatively low (high).

[11] See also Blinder's (1999, p. 44) comments on reputation models, and King's (1995, p. 90) insistence that credibility is not 'all-or-nothing' but a continuous variable.

[12] Data on US government bond yields was also obtained from the Deutsche Bundesbank.

[13] The raw correlations between the yields over the period January 1994-April 1997 are: UK-Germany 0.90, UK-US 0.67, Germany-US 0.71.

[14] Mishkin (1999, p. 599). The phrase seems to have originated in McCallum (1995, p209).

[15] See, for example, Laubach and Posen (1997, p. 35): "The primary gains from announced monetary targets have been through their use as a framework for publicly indicating a monetary-policy stance and for explaining policy intentions with reference to an underlying but public numerical inflation target."

[16] The Bundesbank's independence and reputation is sometimes regarded as having been put in doubt by the German government's success in dictating the conversion rate between Ostmarks and Deutschemarks at the time of German monetary union in

1990. However, the performance of the Bundesbank in raising interest rates subsequently in order to bring inflation under control (at the cost of considerable adverse effects for other ERM countries) has generally been seen in Europe as confirming its status as an independent and anti-inflationary central bank. Our sample starts in 1994 and ends in 1997, and we believe that over that period the credibility of the Bundesbank was not in doubt.

[17] It is worth noting that the Bank of England itself later recognised the basic phenomenon identified here in a discussion of the period (King, 1999, p297): "Long-term interest rates contained a risk premium to reflect the possibility that the timing and magnitude of interest rate changes might reflect political considerations."

[18] The Governor of the Bank referred to the publication and other arrangements as acting "as an additional check and balance to the Chancellor's discretion" (*Bank of England Quarterly Bulletin*, February 1997 p102).

[19] These comments apply *a fortiori* to possible further, more sophisticated, strategic considerations related, for example, to the preferences of each player for the success, failure or further evolution of the monetary framework itself; or to the proximity of the election, which might affect both the parameter γ and the behaviour of the Chancellor. It is also worth noting that this was a short period in which the monetary/institutional framework being operated was quite different from any framework used before in the UK (or elsewhere); the participants were clearly in a situation of imperfect information and uncompleted learning.

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Figure 1: Minimum lending rate 94- 97

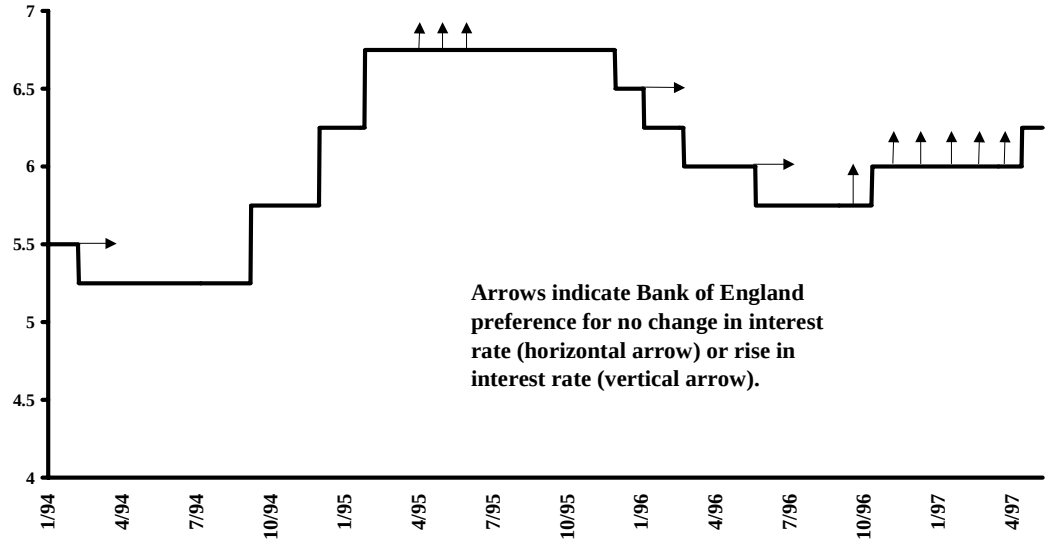

Figure 2: UK-German interest differential and credibility index

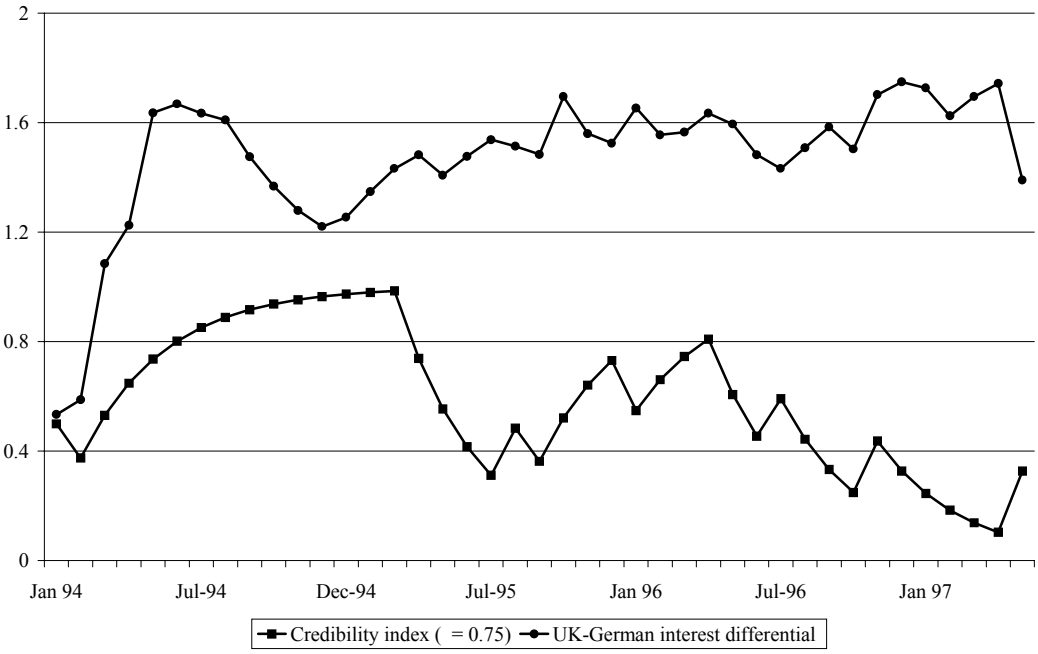

Figure 3: UK, German and US yields

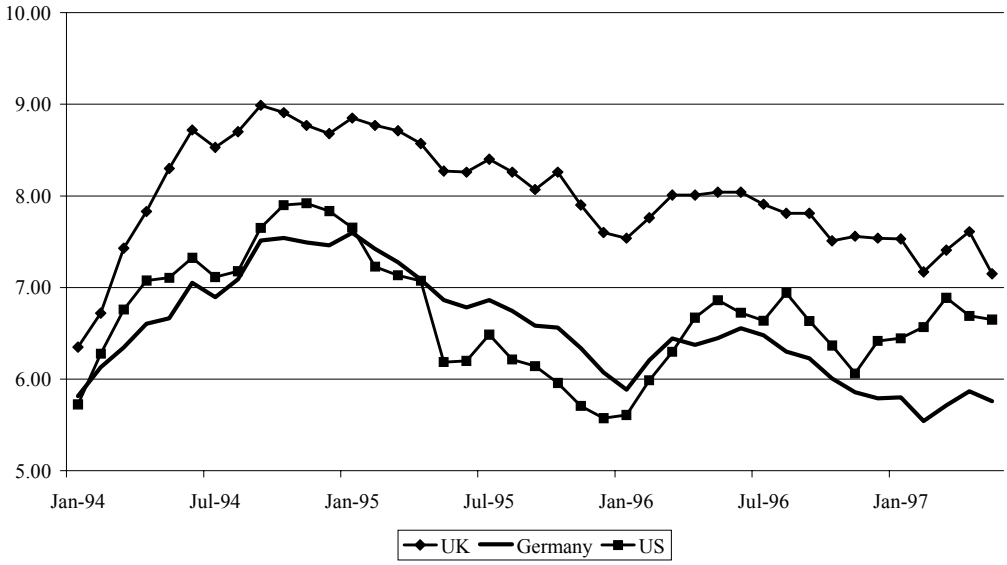

Table 1: The degree of agreement between Governor and Chancellor, January 1994 to May 1997

	C1	C2	C3	C4	C5
B1	2				
B2	2	3			
B3	1	1	6		
B4			4	8	
B5				9	5

The entry in each cell indicates the number of Monthly Monetary Meetings at which the views on interest rates expressed by the Governor and Chancellor were those defined by the rows and columns concerned.

Key: C = Chancellor of the Exchequer
B = Bank of England Governor
1 = wants cut in interest rates
2 = bias towards cut but not justified in this case
3 = no bias for or against cut/rise
4 = bias towards rise but not justified in this case
5 = wants rise in interest rate

Source: Appendix.

Table 2: Regression of IRDIFUKGE = C + βCRED, for various values of γ Sample: 1994:01 1997:05					
	CRED (γ=0.70)	**CRED (γ=0.75)**	CRED (γ=0.80)	CRED (γ=0.85)	CRED (γ=0.90)
R-squared	0.054113	**0.055143**	0.053332	0.045311	0.025560
Adjusted R-squared	0.029859	**0.030916**	0.029058	0.020832	0.000574
S.E. of regression	0.255079	**0.254940**	0.255184	0.256263	0.258900
Sum squared resid	2.537546	**2.534783**	2.539642	2.561160	2.614145
Log likelihood	-1.137803	**-1.115469**	-1.154725	-1.327686	-1.747465

Table 3: Residual Correlations, Dynamic Analysis, Goodness of fit and evaluation of the system. Sample: 1994:04 1997:05			
	IRDIFUKGE	CRED	
IRDIFUKGE	1		
CRED	-0.26837	1	
Eigenvalues of π(1)-I $\|\lambda_\alpha\|$ 0.7947 0.1135			
Eigenvalues of companion matrix $\|\lambda_b\|$ 0.5698 0.3667 0.3667 0.8604 0.6355 0.6355			
Statistic	IRDIFUKGE	CRED	VAR
$\hat{\sigma}$	0.09657	0.12494	
$F_{ar}(3,27)$ [p value]	1.5314 [0.2290]	1.5703 [0.2195]	
$F_{arch}(3,24)$ [p value]	0.3489 [0.7903]	0.1958 [0.8982]	
$F_{het}(12,17)$ [p value]	0.9334 [0.5382]	0.5396 [0.8668]	
χ^2_{nd} (2) [p value]	10.339 [0.006]**	5.6445 [0.0595]	
$F^v_{ar}(12,46)$			1.8429 [0.0688]
$\chi^v_{het}(36,45)$			0.6986 [0.8655]
$\chi^2_{nd}(4)$			14.84 [0.005]**

Notes: F(-,-) and $\chi^2(\cdot)$ denote approximate null distributions, and the degrees of freedom are in parentheses. F_{ar} is a Lagrange multiplier test for third-order residual autocorrelation (see Harvey (1981)); χ^2_{nd} *is* the normality test suggested by Doornik and Hansen (1994); F_{arch} is a Lagrange multiplier test for third-order ARCH residuals due to Engle (1982); and F_{het} checks whether the squared residuals depend on the regressors and their squares (cf. White (1980));corresponding multivariate (system) tests are denoted by ν (see Doornik and Hendry (1997)). Here and below, * and ** denote significance at 5% and 1 % respectively.

TABLE 4: Cointegration analysis 1994 (05) to 1997 (04) of IRDIFUKGE CRED
Eigenvalues: 0.504832 0.0534868

Ho:rank=p	-Tlog(1-μ)	T-nm	95%	-TΣlog(1-μ)	T-nm	95%
	(eigenvalue test)			(trace test)		
p=0	26.01**	21.79**	14.1	28.04**	23.49**	15.4
p≤1	2.034	1.704	3.8	2.034	1.704	3.8

Standardized β' eigenvectors

IRDIFUKGE	CRED	
1.0000	0.4052	
-0.2365	1.0000	

Standardized α coefficients

IRDIFUKGE	-0.74324	0.03109
CRED	-0.12893	-0.10535

*Critical values from Osterwald-Lenum (1992)

TABLE 5: Restricted Cointegration analysis 1994 (05) to 1997 (05)

Standardized β′ eigenvectors and α=Aθ coefficients

	IRDIFUKGE	CRED	
β′ (s.e)	1.0000	0.39121 (0.08457)	
α (s.e)	-0.77158 (0.13826)	0.00000	

LR-test, rank=1: Chi^2(1) = 0.5158 [0.4726]

Table 6: Reduction to I(0). OLS estimates. Sample: 1994 (05) to 1997 (05)

```
DIRDIFUKGE =0.16*DIRDIFUKGE(-1)+ 0.04*DCRED(-1)+ 0.277*C -0.2127*CI(-1)
           (0.18)                (0.18)          (0.123)  (0.095)
DCRED = -0.075*DIRDIFUKGE(-1)+ 0.086*DCRED(-1) -0.119*C + 0.0865*CI(-1)
        (0.190)                (0.184)          (0.126)   (0.097)
```

Model diagnostic tests

Statistic	DIRDIFUKGE	DCRED	VAR
$\hat{\sigma}$	0.120	0.124	
$F_{ar}(3,30)$ [p value]	1.955 [0.1421]	0.3460 [0.7920]	
$F_{arch}(3,27)$ [p value]	0.3363 [0.7993]	0.2527 [0.8587]	
$F_{het}(6,26)$ [p value]	0.3572 [0.8991]	0.6003 [0.7275]	
$\chi^2_{nd}(2)$ [p value]	3.663 [0.1602]	0.9499 [0.6219]	
$F^v_{ar}(12,52)$			2.1723 [0.0273]*
$F^v_{het}(18,68)$			0.8265 [0.6637]
$F^v_{arch}(27,61)$			0.8999 [0.6637]
$\chi^2_{nd}(4)$			6.292 [0.1784]

Table 7: FIML estimates. Sample: 1994 (05) to 1997 (05)

```
DIRDIFUKGE =0.16*DIRDIFUKGE(-1) + 0.04*DCRED(-1)+ 0.277*C – 0.213*CI(-1)
           (0.19)                 (0.18)          (0.12)    (0.095)
```

Model diagnostic tests

Statistic	DIRDIFUKGE
$\hat{\sigma}$	0.121
$F_{ar}(3,30)$ [p value]	1.9546 [0.1421]
$F_{arch}(3,27)$ [p value]	0.3362 [0.7993]
$F_{het}(6,26)$ [p value]	0.3572 [0.8992]
$\chi^2_{nd}(2)$ [p value]	3.6629 [0.1602]

TABLE 8: Cointegration analysis 1994 (05) to 1997 (04) of IRDIFUKUS CREDγ98
Eigenvalues: 0.149858 0.030396

Ho:rank=p	-Tlog(1-μ)	T-nm	95%	-TΣlog(1-μ)	T-nm	95%
	(eigenvalue test)			(trace test)		
p=0	6.16938		15.67	7.34236		19.96
p≤1	1.17298		9.2	1.17297		9.2

*Critical values from Osterwald-Lenum (1992)

Appendix I: Monthly Monetary Meetings 1994-97

Meeting	Date	Classification	Interest rate change	Resulting interest rate level
1	12.1.94	B2-C2		5.5
2	2/3.2.94	B2-C1	-0.25	5.25
3	2.3.94	B2-C2		5.25
4	30.3.93	B2-C2		5.25
5	4.5.94	B3-C3		5.25
6	8.6.94	B4-C4		5.25
7	6.7.94	B4-C4		5.25
8	28.7.94	B4-C4		5.25
9	7.9.94*	B5-C5	+0.5	5.75
10	26.9.94	B3-C3		5.75
11	2.11.94	B4-C4		5.75
12	7.12.94	B5-C5	+0.5	6.25
13	28.12.94	B3-C3		6.25
14	2.2.95	B5-C5	+0.5	6.75
15	8.3.95	B4-C4		6.75
16	5.4.95	B4-C3		6.75
17	5.5.95	B5-C4		6.75
18	7.6.95	B5-C4		6.75
19	5.7.95	B5-C4		6.75
20	27.7.95	B4-C4		6.75
21	7.9.95	B4-C3		6.75
22	29.9.95	B4-C4		6.75
23	1.11.95	B4-C4		6.75
24	13.12.95	B1-C1	-0.25	6.5
25	17.1.96	B2-C1	-0.25	6.25
26	7.2.96	B3-C3		6.25
27	7.3.96	B1-C1	-0.25	6.0
28	3.4.96	B3-C3		6.0
29	8.5.96	B3-C2		6.0
30	5.6.96	B3-C1	-0.25	5.75
31	3.7.96	B3-C3		5.75
32	30.7.96	B4-C3		5.75
33	4.9.96	B4-C3		5.75
34	23.9.96	B5-C4		5.75
35	30.10.96	B5-C5	+ 0.25	6.0
36	11.12.96	B5-C4		6.0
37	15.1.97	B5-C4		6.0
38	5.2.97	B5-C4		6.0
39	5.3.97	B5-C4		6.0
40	10.4.97	B5-C4		6.0
41	6.5.97	B5-C5	+0.25	6.25

Note * The Chancellor decided on the change only on 9.9.94.