

The Influence of Sterling on Irish Interest Rates

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Abstract: The influence of the Sterling real exchange rate on the Irish-German interest rate differential is assessed over the period 1987 to 1992. The estimation allows for structural change by permitting time variation in the model's parameters. Estimates derived using the Kalman Filter estimator suggest that the downward trend in the interest rate differential was a consequence of stable currency markets, with the real exchange rate close to its equilibrium level, rather than a totally credible exchange rate policy.

I INTRODUCTION

Recent empirical research has focused on the credibility of Irish exchange rate policy in the period between the August 1986 devaluation and the exchange rate crisis of late 1992 with emphasis given to the correlation between Irish interest rates and Sterling exchange rates. In the wake of the 1986 devaluation Irish policy makers appeared to move towards a "hard ERM" strategy targeted at severing links between movements in Sterling and expectations of an Irish Pound realignment within the Exchange Rate Mechanism (ERM). For example the then Governor of the Central Bank describes exchange rate policy since 1987 as being "expressed clearly in terms of the ERM commitment and the Government remains committed to a policy similar to the 'franc fort' policy pursued in France" (Doyle, 1992, p. 45).

In general, when deteriorating competitiveness against the UK fuels expectations of an Irish Pound devaluation, the authorities may be forced to accept higher domestic interest rates in order to stem speculative outflows.

*I am indebted to Brendan Walsh, Patrick Honohan and two referees for helpful comments. The usual disclaimer applies.

However the extent to which such expectations materialise may depend on the perceived credibility of exchange rate policy. If, as intended by the "hard ERM" strategy, market participants accept the credibility of the DM peg then a loss of competitiveness against Sterling does not necessarily imply an increased probability of a realignment and, as a consequence, a rise in interest rates. Hence a gain in credibility should be associated with a lower correlation between movements in domestic interest rates and the Sterling exchange rate.

Walsh (1993) considers the relationship between Irish, German and British short-term interest rates and the real Sterling exchange rate. He concludes that although the relative importance of the UK variables diminished over 1990 to 1992 they continued to exert a significant influence on Irish interest rates, suggesting that the policy of no realignments, while partially successful in moderating the influence of Sterling, was not fully credible. A stronger conclusion is reached by Honohan and Conroy (1994) who analyse the influence of Irish pound exchange rates against Sterling and the DM on the Irish-German interest rate differential. They report that most of the variation in the latter can be explained by the Sterling exchange rate and that its influence is relatively constant over 1982 to 1992. In particular, their results cannot identify a significant role for the DM exchange rate or support the hypothesis that the "hard ERM" policy pursued between the August 1986 devaluation and the currency crisis of September 1992 increased the credibility of the DM-peg as a means of narrowing the Irish-German interest rate differential.

The present paper takes an alternative approach to that used by Walsh and by Honohan and Conroy. Rather than assuming that shifts occur at discrete and identifiable points in time this paper uses a specification based on time-varying parameters which permit gradual, or evolving, changes in the model's structure. The rationale underlying this approach can be explained by the following hypothetical example. Suppose the monetary authorities announce a new policy such as a firmer commitment to the DM-peg and that this is, correctly, interpreted as meaning that they will not respond to exchange rate changes against non-ERM currencies. Hence, a researcher using time series data and least squares techniques to investigate the influence of the Sterling exchange rate on Irish interest rates might reasonably expect to find a structural break coinciding with the period in which the policy change takes place and a decline in the exchange rate coefficient. However, if the policy shift is not fully understood or not fully explained by the authorities, then standard testing procedures may be unable to correctly identify structural changes in the underlying interest rate process because market participants, even if they make decisions on all available

information, will not necessarily adjust their behaviour to accommodate the new, but uncertain, policy. Rather, the full impact of the policy shift may not be evident in the researcher's estimates until the market adjusts to the new, but evolving, policy.

The following section discusses the Walsh and Honohan and Conroy models in more detail and illustrates how the latter can be modified to incorporate parameter variation which can be estimated with the Kalman Filter. Results for 1986 to 1992, presented in Section IV, provide support for Walsh's general conclusions and, to a lesser extent, for those of Honohan and Conroy. Specifically, the estimates suggest a decrease in the importance of the UK interest rate and a reduced responsiveness in the Irish-German interest rate differential to changes in the real Sterling exchange rate. However, as the latter retains statistical significance throughout the sample period we cannot conclude that exchange rate policy was the dominant factor driving the convergence of Irish interest rates with those in Germany.

II MODEL SPECIFICATION

The models used by Walsh and Honohan and Conroy both start with an uncovered interest parity condition which equates the domestic interest rate to the difference between the "foreign interest rate" and the expected appreciation of the Irish pound. Walsh models the former as a weighted average of the corresponding UK and German interest rates while Honohan and Conroy use a parity condition against the DM only. However, both assume that the nominal rate of appreciation is a function of the deviation of the real exchange rate from its long-run, or target, level. Walsh's approach yields a long-run model which expresses the Irish interest rate as a linear function of German and British rates and the real exchange rate against Sterling.¹ Walsh estimates a dynamic error correction version of this model using monthly data for two periods, 86:8 to 89:7 and 89:8 to 92:8. His estimates suggest an increase in the relative importance of the German interest rate and a decline in the responsiveness of Irish interest rates to changes in the real Sterling exchange rate. The latter is, however, statistically significant in both subperiods. Hence Walsh concludes that although Ireland's ERM commitment gained credibility over 1986 to 1992, "the continued role of both the Sterling exchange rate and the UK interest rate indicates that the EMS peg was not wholly successful in breaking the influence of developments in the British economy on Irish interest rates" (p. 448).

1. Walsh uses the real exchange rate against Sterling whereas Honohan and Conroy use a weighted average of Sterling and DM rates. However, in each model the long-run real exchange rate is assumed constant.

Honohan and Conroy use an alternative approach in that they decompose the DM nominal exchange rate into its central rate and spot position within the ERM band. However, both the probability of a realignment and the expectation on a change in the spot position are modelled as simple linear functions of the current competitiveness position which, as in Walsh, is defined, as the deviation of the real exchange rate from its equilibrium level. Although their model suggests a time-varying parameter approach they resort to least squares by assuming a constant risk premium and equal devaluations at realignments. Using monthly data over 1982:2 to 1992:7 they conclude that "overall, the results support a remarkably simple specification, with the nominal sterling exchange rate as the key variable" (p. 218). Honohan and Conroy also use 'slope dummies to assess the influence of the Sterling and DM exchange rates over 1986:8 to 1992:7 but find that these dummies are insignificant suggesting no significant gain in credibility during this period which is characterised by an absence of realignments and a firmer commitment to ERM parities.²

It is of interest to note that they interpret this latter result as indicating that "there is no evidence of an increase in the responsiveness of the interest rate to the Sterling exchange rate after the 1986 unilateral devaluation, contrary to the fears of some market commentators at the time of the devaluation and thereafter" (p. 215). However in most of their regressions the Sterling dummy has a negative sign and in one case, using the real exchange rate, approaches significance with a t-statistic of 1.60. This suggests an alternative interpretation: as the slope dummies span the period of the no devaluation policy, it is plausible to expect a negative sign for these coefficients on the hypothesis that the objective was to increase credibility and, if successful, reduce the responsiveness of domestic interest rates to the Sterling exchange rate. Hence their results may indicate that there was no significant gain, rather than no loss, in credibility over 1986 to 1992.

These papers share a common methodology in that they each allow for structural change at a specific point in the data sample. For example, although Walsh's results suggest some credibility gain over 1990 to 1992 his methodology implies that the model's parameters are constant within each period and that changes between the end of the first period and the start of the second are correctly anticipated by market participants. Hence the implications of a policy change announced in period t , such as a firmer

2. Walsh's results differ in that his tests reject the hypothesis of constant parameters. This may be due to different sample periods and/or different data. Honohan and Conroy use on-shore interest rates whereas Walsh uses off-shore Euro-Sterling and Euro-DM rates. Walsh also estimates a dynamic error correction model while Honohan and Conroy use a static model with a correction for autocorrelation.

commitment to ERM parities, are assumed to be fully understood in terms of their effects on the structure of the interest rate process. On the other hand, if a policy change is not fully understood, or is implemented but not announced, then market participants may have to "guess" or "estimate" its impact and the model's parameters. Also, it is possible that unanticipated events, such as a rapid depreciation against Sterling, may lead to uncertainty about the feasibility of existing policy commitments and, as a consequence, to variations in the structure of the interest rate process. Again this suggests that interesting results might be obtained from a specification which permits the parameters to change over time.

To implement a procedure which allows for parameter variation I follow Honohan and Conroy by starting with an uncovered interest parity condition against the DM with the log spot exchange rate decomposed into the central rate (c_t) and the spot position within the ERM band (x_t). That is:

$$r_t - rdm_t = s_t - E(s_{t+1}) \quad (1)$$

where r_t denotes the domestic interest rate, rdm_t the corresponding German rate, s_t the log of the spot rate, DM per IR£, and $s_t = c_t + x_t$. If θ denotes the probability of a change in the central rate and δ_{t+1} the size of the devaluation then the expected change in the spot rate is:

$$s_t - E(s_{t+1}) = \theta\delta_{t+1} + x_t - E(x_{t+1}) \quad (2)$$

Honohan and Conroy model θ and the expected change in x_t as linear functions of the deviation of the real exchange rate (q_t) from its target level. That is:

$$\theta = \theta_1 + \theta_2(q_t - \bar{q}_t) \quad (3)$$

$$x_t - E(x_{t+1}) = \phi_1 + \phi_2(q_t - \bar{q}_t) \quad (4)$$

where \bar{q}_t is the target, or equilibrium, level.³ Assuming δ_{t+1} constant and combining (1), (2), (3) and (4) gives:

$$r_t - rdm_t = \beta_1 + \beta_2(q_t - \bar{q}_t) \quad (5)$$

3. Honohan and Conroy define q_t as a weighted average of the real exchange rates against Sterling and the DM. However as the 1986 and 1993 devaluations were primarily responses to competitive losses on UK markets the Sterling rate is used in this paper. Hence $q_t = \log(S_{sg}P/P_{sg})$ where S_{sg} is the nominal rate (£ per IR£) and P, P_{sg} are the respective price levels.

where the β 's are functions of the parameters of (3) and (4). Following both Walsh and Honohan and Conroy the present paper also assumes \bar{q}_t constant but amends (5) as follows. First, the Sterling interest rate is included on the grounds that competitiveness against the UK depends on financial market conditions as well as movements in the real exchange rate. For example, other things equal, a decline in UK interest rates gives a relative advantage to sectors of the British economy specialising in the production of import substitutes.⁴ Second, (5) implies that a given change in q_t generates the same probability of a realignment irrespective of the exchange rate policy in force and, by implication the same change in r_t relative to rdm_t . However, as θ reflects the market's judgement of official reaction to changes in competitiveness it cannot be assumed invariant with respect to exchange rate policy. For example, if the policy regime shifts from one which accommodates competitive losses against Sterling to a strategy based on a firmer commitment to the DM peg then we might expect to observe a decline in θ for a given deviation of q_t from its target level. This type of change in the interest rate process can be accommodated by allowing the parameters to vary over time. Finally, adding a lagged dependent variable to allow for "policy smoothing" gives the following model specified in matrix form:⁵

$$y_t = Z_t \beta_t + u_t : u_t \sim N(0, \sigma^2) \quad (6)$$

where $y_t = r_t - rdm_t$, $Z_t = (1, q_t, rsg_t, y_{t-1})$, rsg is the Sterling interest rate and $\beta_t = (\beta_{1t}, \beta_{2t}, \beta_{3t}, \beta_{4t})$.

Honohan and Conroy estimate variants of (5) but include a linear trend as a proxy for possible omitted variables. While trends may be a feature of the sample data they are not necessarily characteristic of the population. In particular, when the dependent variable is an interest rate differential there does not appear to be any clear intuition as to why its long-run value, with $q_t = \bar{q}_t$, should be changing at a constant rate over time. This, however is the implication of including a linear trend in (5). Over the data period used in this paper, 1986 to 1992, the Irish-German interest rate differential is strongly trended with the two rates converging and the objective of any model should be to explain this convergence. Including a trend "de-trends" the data and removes the feature which the model should be trying to explain. Hence the other included variables can only explain deviations from the trend.

4. Including the UK interest rate in a simple dynamic specification goes some way towards reconciling (5) with Walsh's model.

5. Ó Cofaigh (1983) suggests that "although the Central Bank does not attempt to affect the broad trend of interest rates, it does pursue ... the important function of smoothing ... fluctuations in interest rates."

Specification (6), on the other hand, offers at least two explanations for interest rate convergence — the convergence of the real exchange rate towards its target level and credibility gains modelled by variation in the parameters. While the time varying parameter approach can be considered as an alternative to including a linear trend it provides a possible explanation for trends in the data, or convergence, which, conceivably, can be given an economic interpretation in terms of credibility gains. If valid this appears to be a more attractive approach than “de-trending” which controls for convergence in an arbitrary manner by assigning the cause to unspecified omitted variables. Honohan and Conroy also control for serial correlation by using an autoregressive estimator. Hence, in contrast to Walsh, their model is completely static. Autocorrelation may be detected in static models because of omitted variables or because of mis-specified dynamics. In the former case an autoregressive estimator may control for omitted variables but requires validation by appropriate common factor tests which are not reported by Honohan and Conroy.⁶

III ESTIMATION AND RESULTS

If policy shifts are well understood and considered credible then the parameters of (6) may, as in Walsh and Honohan and Conroy, be estimated by standard least squares methods with slope and intercept dummies used to control for the policy shift. Note that in this case, for given Z_{t+1} , the conditional expectation of y_{t+1} is $E_t y_{t+1} = Z_{t+1} \beta_{t+1}$. On the other hand, if the policy is not well understood with market participants having to estimate its implications for changes in the interest rate differential then the conditional expectation is $E_t y_{t+1} = Z_{t+1} E_t \beta_{t+1}$, where $E_t \beta_{t+1}$ is the estimate of β_{t+1} . As the latter requires a stochastic specification for β_t this paper models the parameter vector as a random walk. That is:

$$\beta_t = \beta_{t-1} + \varepsilon_t : \varepsilon_t \sim N(0, \Omega_t) \quad (7)$$

While the choice of an appropriate specification for β_t is often arbitrary in time-varying parameter models, the use of a random walk model in the present context may be justified as follows.⁷ If changes in exchange rate and/or interest rate policy are the major source of parameter variations and if

6. In a least squares regression of y_t on a constant, y_{t-1} , q_t and q_{t-1} an AR(1), or Cochrane-Orcutt, procedure requires that the data accepts the common factor restriction that the product of the coefficients on y_{t-1} and q_t equals minus the coefficient on q_{t-1} . Estimating over 1987:1 to 1992:8 gives a Wald Chi-square statistic of 8.84 which, with 1 df, clearly rejects the restriction.

7. See Evans (1991) who uses a similar argument to justify a random walk specification for the parameters of the US inflation process.

policy changes at time $t+1$ cannot be predicted at time t then $E_t \beta_{t+1} = \beta_t$ as implied by a random walk. Further, if, as is demonstrated in Frain (1993), the variables under consideration contain unit roots then the random walk specification will allow for this characteristic as shocks to β_t will have a permanent effect on y_t .

Equations (6) (measurement), and (7) (transition), constitute a state-space model with time-varying parameters which can be estimated with the Kalman Filter.⁸ If b_{t-1} denotes a prior estimate for β_{t-1} based on observations through $t-1$, the optimal linear predictor for b_t is given by $b_{t|t-1} = b_{t-1}$ with covariance matrix $\Sigma_{t|t-1} = \Sigma_{t-1} + \Omega_t$. When a new observation becomes available the Kalman filter gives the updating equations:

$$b_t = b_{t|t-1} + K_t [y_t - Z_t b_{t|t-1}] \quad (8)$$

$$\Sigma_t = \Sigma_{t|t-1} - K_t Z_t \Sigma_{t|t-1} \quad (9)$$

where $K_t = \Sigma_{t|t-1} Z_t' [Z_t \Sigma_{t|t-1} Z_t' + \sigma^2]^{-1}$ is the Kalman gain. Hence the updated estimate b_t is computed as the prior estimate plus the prediction error $[y_t - Z_t b_{t|t-1}]$ weighted by the gain of the Kalman Filter. Setting $\Omega_t = 0$ implies that $\beta_t = \beta_{t-1}$ and gives the classical fixed coefficient model. While the fixed coefficient approach permits investigation of structural change it requires that the researcher has prior knowledge of when the change occurs.⁹ In the present context where market participants may assign credibility to a policy shift only when they learn how the authorities react to variations in competitiveness it is more appropriate to permit structural change to evolve over time and set $\Omega_t \neq 0$ which allows β_t to change randomly from one period to the next.

The parameter vector β_t was estimated using monthly data over 1986:10 to 1992:8. The Irish interest rate is the end of period three-month interbank rate while those for Germany and the UK are three-month Euro-rates. The Sterling real exchange rate was computed using the end of month nominal rate and consumer price indices for Ireland and the UK.¹⁰ Following Chavas

8. See Chow (1983) for details.

9. When $\Omega_t = 0$ the population parameters are assumed constant and Kalman estimates are asymptotically equivalent to OLS. Although the Kalman Filter may give varying parameters due to sampling error, estimation by least squares over $t = 1 \dots T$ will give the results identical to Kalman estimates for period T .

10. With the exception of the price indices all series were taken from the Central Bank of Ireland *Quarterly Bulletin*. The former are from OECD *Main Economic Indicators*. The data set is similar to that used by Walsh except that the monthly Irish CPI series was interpolated from the original quarterly series. The RATS software package was used for all computations.

(1983) the process noise Ω_t was assumed proportional to Σ_{t-1} , the variance of the parameter estimates at time $t-1$ with the factor of proportionality estimated by minimising the one-step-ahead prediction error. To initialise the estimation starting values for b and Σ were taken from a least squares regression using data for 1985:1 to 1986:8 with estimates for 1986:10 to 1992:8 computed via the Kalman Filter.

Table 1: *Kalman Estimates*

<i>Period</i>	<i>Constant</i>	q_t	rsg_t	y_{t-1}	<i>SSE</i>
1986:10	-5.077 (2.295)	0.168 (0.040)	1.021 (0.253)	0.402 (0.137)	0.684
1987:06	-1.926 (1.712)	0.151 (0.035)	0.655 (0.167)	0.538 (0.109)	0.720
1988:06	-0.424 (1.146)	0.115 (0.031)	0.448 (0.127)	0.584 (0.105)	0.657
1989:06	0.480 (1.247)	0.113 (0.033)	0.226 (0.107)	0.776 (0.075)	0.633
1990:06	1.928 (1.284)	0.075 (0.029)	-0.009 (0.082)	0.861 (0.077)	0.664
1991:06	1.836 (1.367)	0.075 (0.031)	0.012 (0.104)	0.839 (0.076)	0.606
1992:06	1.710 (1.316)	0.077 (0.033)	0.022 (0.121)	0.842 (0.076)	0.664
1992:08	1.753 (1.323)	0.078 (0.034)	0.022 (0.125)	0.838 (0.074)	0.546

Note: Standard errors are in parentheses.

Kalman estimates for June of each year together with the starting and final values are given in Table 1.¹¹ The exchange and interest rate coefficients both decline over the estimation period with the former retaining statistical significance throughout and the latter becoming insignificantly different from zero by mid-1990. The coefficient on the lagged dependent variable (y_{t-1}) increases from an initial value of 0.4 to a relatively stable value of approximately 0.8 from late 1990 onwards. Conversely, the exchange rate coefficient falls from 0.168 to an almost constant value of 0.07 from mid-1990. When interpreted in a partial-adjustment framework, this implies that the short-run, or impact, effect of the real exchange rate diminishes over the first half of the sample period while the long-run, or equilibrium, effect

11. Kalman estimates start in 86:10 because y_{t-1} is included in Equation (6). Ljung-Box test statistics for serial correlation in the Kalman residuals are: $\chi^2(1) = 0.186$, $\chi^2(2) = 0.250$, $\chi^2(3) = 0.938$, $\chi^2(4) = 0.994$ which are insignificant at the 95 per cent level.

increases.¹² However, both coefficients appear to stabilise from late 1990 onwards and the relatively high value of the autoregressive parameter indicates considerable persistence in the interest rate differential. Together with the statistical significance of the coefficient on the exchange rate these results suggest that the declared commitment to the DM-peg was not sufficient to break the link between Irish interest rates and movements in Sterling.

A more comprehensive picture is given by Figures 1 and 2 which display normalised Kalman coefficients for the real exchange rate and the Sterling interest rate over the estimation period. These normalised estimates are computed as:

$$\hat{t}_{it} = \frac{\hat{\beta}_{it} - \hat{\beta}_{i0}}{SE(\hat{\beta}_{i0})} \quad i = 2, 3 \quad (10)$$

where $\hat{\beta}_{it}$ is the Kalman estimate, $\hat{\beta}_{i0}$ is the starting value and SE is the latter's standard error. McNelis and Neftçi (1982) define these normalisations as a "time-varying version of the standard t-test, where the hypothesised value and the standard error are held constant at the initial starting points" (p. 301). They should not, however, be interpreted as indicating statistical significance as in constant parameter models. Rather, they indicate the "significance" of the deviation in each parameter from its initial value relative to what may be considered normal variation in the latter. Note also that as the initial value and its standard error are constants, the patterns of the normalised coefficients in Figures 1 and 2 exactly replicate those of the Kalman estimates. With the exception of the vertical axis scale, graphs for the actual estimates are identical to those for the normalised estimates.

Figure 1 indicates that the exchange rate coefficient increases over the second half of 1986, probably as a response to the August devaluation, and then decreases to a relatively constant value between mid-1988 and the second half of 1989. The estimate then declines from just over 0.1 in June 1989 to a stable level of approximately 0.07 which persists from mid-1990 to August 1992. The normalised t-ratio of approximately -2.0 indicates a significant change relative to the initial value with the sharp decline in late 1989 suggesting a possible structural shift. Given that the Irish Pound appreciated by approximately 6 per cent in real terms between end-1988 and end-1989, it is possible that the market may have attached greater credibility to exchange policy. Alternatively, it is possible that factors other than movements in the Sterling exchange rate may have led to increased

12. I am grateful to an anonymous referee for drawing my attention to this feature of the estimates.

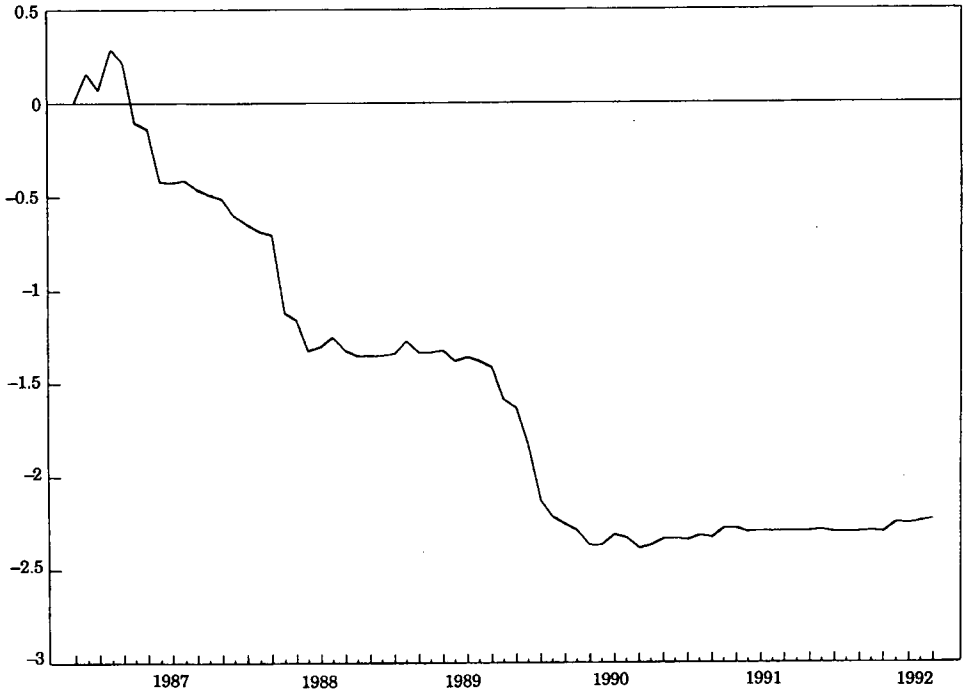


Figure 1: Normalised Estimate for β_{2x} : Real Exchange Rate

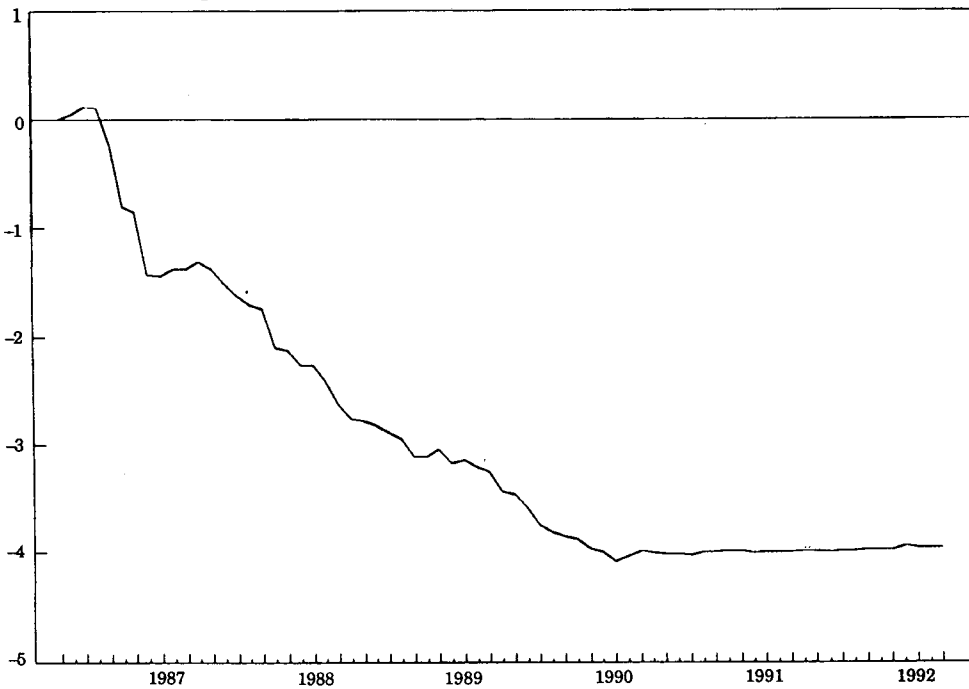


Figure 2: Normalised Estimate for β_{3t} : UK Interest Rate

confidence in exchange rate policy.¹³ For example, the Exchequer Borrowing Requirement (EBR) declined from 9.9 per cent of GNP in 1987 to 3.3 per cent in 1988 and 2.3 per cent in 1989. Hence continued improvement in the public finances together with a strong trading position and significant employment growth may have strengthened the market's belief in the feasibility of the DM-peg leading to a possible credibility gain. If this is the case, then the decline in β_{2t} in late 1989 may be reflecting the influence of omitted variables rather than a gain in credibility *per se*. This interpretation is given some support by the absence of any significant change in the exchange rate coefficient when Sterling continued to weaken over the first half of 1990. Despite Sterling's weakness, the "economic fundamentals" may have been considered strong enough for the authorities to maintain a constant exchange rate against the DM given a relatively modest real appreciation against Sterling.

As with the real exchange rate, the UK interest rate coefficient, Figure 2, declines steadily from early 1987 and reaches a stable value in mid-1990. Given a normalised t-ratio of -4.0 this movement appears to be highly significant relative to the starting value. However, unlike the exchange rate coefficient which also stabilises in mid-1990, the UK interest rate ceases to have a significant influence on the Irish-German interest differential from late 1989 onwards.

IV CONCLUSIONS

This paper reconsiders the relationship between the Irish-German short term interest differential and the Sterling real exchange over a period between the unilateral devaluation in August 1986 and the onset of the ERM currency crisis in September 1992. As with previous papers the approach used allows for structural change by permitting the model's parameters to vary over time. However, rather than assuming prior knowledge on when structural shifts may occur, the estimation procedure assumes a stochastic random walk process which permits the parameters to evolve over time.

The general picture which emerges from the results is that the influence of UK variables on the Irish-German interest rate differential appears to have diminished over the sample period. In particular, the decline in the estimate for β_{2t} from 0.168 in October 1986 to 0.078 in August 1992 suggests a possible gain in credibility in the sense that the differential becomes much less responsive to movements in the real exchange rate. To this extent the "hard ERM" policy introduced in the wake of the August 1986 devaluation appears to have been partially successful. However, at least three factors must be borne in mind when interpreting the results. First mid-1990 to August 1992 was a period characterised by relatively stable foreign exchange markets with

13. I am grateful to an anonymous referee for this suggestion.

little movement in the real exchange rate against Sterling and an absence of pressure on Irish interest rates. Hence, it is possible to argue that the "hard ERM" policy was never really tested in the sense that the strategy was never confronted with a sharp depreciation of Sterling. When this eventually happened in late 1992 the policy disintegrated and the Irish pound was devalued by 10 per cent in January 1993. Second the exchange rate coefficient, while decreasing over the estimation period, retains statistical significance throughout. In terms of the model outlined in Section II this implies that the market did not completely discount the probability of a realignment even though exchange rate movements in the latter part of the sample period posed little threat to the Irish pound's position within the ERM band. This suggests that although there is evidence of modest gains in credibility, the downward trend in the interest rate differential was also a consequence of stable currency markets, with the real exchange rate close to its target level, rather than total credibility of exchange rate policy. Third, an improving fiscal situation together with a strong economic performance and an upward trend in the German interest rate may also have been responsible for narrowing the differential.

Finally, although the results in this paper are broadly consistent with those suggested by Walsh and, to a lesser extent, by Honohan and Conroy who report no change in Sterling's influence over the "hard ERM" period, they appear to be contrary to recently expressed views of the Central Bank. For example:

the strong defence of the currency ... underlined Ireland's commitment to the ERM and market perception of this has undoubtedly contributed to the rapid reduction in interest rates since end-January (Central Bank of Ireland, *Annual Report* 1992, p.9).

It is significant that this view was expressed in mid-1993 and that the "rapid reduction in interest rates" refers to the period following the February 1993 devaluation. Hence the Bank appears to be claiming that the no devaluation strategy followed from September 1992 to January 1993 was a significant factor underlying the post-devaluation fall in interest rates. While the reasoning behind this position is far from clear, it surely implies that the authorities' strategy could not have diminished credibility during the months of the currency crisis. However, when the Kalman estimates are extended to include data to December 1992 the exchange rate coefficient increases to 0.167, with a standard error of 0.032, which is exactly equal to the initial value in September 1986 and suggests a loss of credibility over September to December when policy was characterised by a "strong defence of the currency".

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