Working Paper

INTERNATIONAL MONETARY FUND
Abstract

This paper explores the determinants of expected rates of realignment of the French franc/Deutsche mark exchange rate during the period 1987-1991. It does so by first estimating expected parity changes and then relating these to economic variables that are believed to influence agents' realignment expectations. Time-varying expected rates of realignment are estimated in two ways: one, by adjusting short-term euromarket interest rate differentials for the expected rate of change of the FF/DM exchange rate within the EMS fluctuation band and two, by the differential in the yield on long-term government bonds. The behavior of the exchange rate within the band is found to be consistent with mean reversion and the expected change is nontrivial. Thus, by filtering out the expected mean reversion within the band from short-term interest rate differentials more precise measures of expected changes in the central parity are obtained. Realignment expectations are found to be closely related to the evolution of fundamental economic variables and, for shorter horizons, the position of the franc in the fluctuation band.

JEL Classification Numbers:
E43, F31, F33
Summary

Since the realignment of currencies in the exchange rate mechanism of the European Monetary System (EMS) in January 1987, the differential between French and German interest rates has narrowed considerably. Nevertheless, the persistence of a significant differential across the maturity spectrum suggests that market participants anticipate a realignment of central parities in the EMS before exchange rates are irrevocably fixed in the final stage of European economic and monetary union.

This paper explores the determinants of expected rates of realignment of the French franc/deutsche mark exchange rate. It does so by first estimating expected parity changes and then relating these to economic variables that are believed to influence market participants' realignment expectations. Time-varying expected rates of realignment are estimated in two ways: one, by adjusting short-term Euromarket interest rate differentials for the expected rate of change of the FF/DM exchange rate within the EMS fluctuation band and, two, by using the differential in the yield on long-term government bonds.

The behavior of the exchange rate within the band is found to be consistent with mean reversion, and the expected change is nontrivial. Thus, by filtering out the expected mean reversion within the band from short-term interest rate differentials, more precise measures of expected changes in the central parity are obtained than those given simply by interest differentials. This adjustment is important because the "credibility bounds" on short-term interest rates are rather large. Realignment expectations are found to be related to the evolution of such fundamental economic variables as inflation differentials, competitiveness, unemployment, government financing requirements, foreign reserves, and, for shorter horizons, the position of the franc in the fluctuation band. France's favorable economic performance, especially on inflation, the external position, and the fiscal situation, has allowed the implicit expected rate of devaluation to decrease considerably. The analysis in this paper suggests that interest differentials could be narrowed further by an improved labor market performance and, in the case of short-term rates, by a strengthened position of the franc in the fluctuation band.
I. Introduction

Since the realignment of currencies in the exchange rate mechanism of the European Monetary System (EMS) in January 1987, the differential between French and German interest rates has narrowed considerably. 1/ Nevertheless, the continuing existence of a differential suggests that market participants do not rule out a realignment of central parities in the EMS before exchange rates are irrevocably fixed in the final stage of Economic and Monetary Union (EMU). Specifically, the positive interest rate differential in favor of Germany across the maturity spectrum implies that there is still a perceived risk of devaluation of the franc/deutsche mark exchange rate. Indeed, attempts to quantify the various factors that might explain the French-German interest rate differential find that these account for only part of the differential. 2/

The persistence of a positive interest rate differential suggests that an announced commitment to a fixed exchange rate may not be sufficient to completely eliminate devaluation risk. Economic performance and the authorities' policy approach also influence investors' expectations. Thus, exchange rate policy may not be fully credible if, for instance, problems of unemployment, a weak external position, or other perceived weaknesses cast doubt on the authorities' ability to maintain their commitment. In the same vein, a policy of keeping the exchange rate close to the upper (weak) edge of the fluctuation band may also not help establish credibility.

This paper examines expectations of realignment of the franc/deutsche mark (henceforth FF/DM) central parity during the period February 1987 to November 1991. The aim is to estimate the expected rate of realignment and to attempt to identify the factors that might influence market participants' expectations of parity changes.

A commonly used measure of the expected rate of realignment of a currency is the differential between interest rates on domestic currency-denominated assets and foreign currency-denominated assets. This measure is imprecise, however, especially for interest rates at the short end of the maturity spectrum, because interest rate differentials are affected by expected changes in the exchange rate within the fluctuation band of the Exchange Rate Mechanism (ERM). In what follows, estimates of the time-varying expected rate of realignment are first constructed by adjusting interest rate differentials on three, six, and twelve-month Eurofranc and Euro-deutsche mark deposits for the expected rate of change of the FF/DM exchange rate within the fluctuation band. The latter is, in turn, arrived at by assuming that the exchange rate inside the band follows a mean-reversion process. The calculated expected parity changes are then regressed on a number of macroeconomic variables that agents are thought to

1/ This was true when the paper was drafted in Summer 1992. Short-term interest differentials widened sharply in September in the events surrounding France's referendum on the Maastricht treaty and the withdrawal of the pound sterling and the Italian lira from the Exchange Rate Mechanism of the EMS. Since then, short-term differentials have tended to fluctuate.

consider in forming expectations of a currency's possible realignment. A similar analysis is also conducted with long-term government bond yields. Inflation differentials, competitiveness, unemployment rates, relative fiscal situations, and the position of the exchange rate within the band are found to play an important role in the formation of exchange rate expectations.

II. Interest Rate Differentials, Exchange Rate Bands, and Credibility

Under current EMS arrangements, interest rates on financial assets which differ only in the currency of denomination can diverge because of the discounting of two types of exchange rate uncertainty: the day-to-day fluctuations in exchange rates within the ERM bands, and the possibility of realignments of central rates. It is widely accepted that since the January 1987 realignment the EMS target zones have become much more credible. This has allowed devaluation risk premia to decline and interest rate differentials to narrow considerably. For example the differential on 12-month Eurofranc and Euro-deutsche mark interest rates (Chart 1) declined from a mean differential of 4.7 percentage points in 1987 to 0.25 percentage points in 1991.

A simple way to test the credibility of the EMS target zones is to suppose that investors at time $t$ expect with certainty that there will be no realignment (or change in the width of the exchange rate band) up to time $t+m$, the time of maturity of a given asset. Then at time $t+m$ the spot exchange rate is expected with certainty to be bounded by:

$$S_t^L \leq S_{t+m} \leq S_t^U \tag{1}$$

where $S$ is the domestic currency price of foreign exchange (FF/DM), and $S^L$ and $S^U$ are the lower and upper margins of the exchange rate band. Hence, the net profit from a forward sale of one unit of foreign currency is bounded by:

$$F_t^m - S_t^U \leq F_t^m - S_{t+m} \leq F_t^m - S_t^L \tag{2}$$

where $F_t^m$ is the forward exchange rate at time $t$ for maturity $m$ (measured in years). Further assuming that arbitrage eliminates certain positive minimum profits, it follows that if the forward exchange rate lies outside the exchange rate bands, then the target zone is not credible. If the forward exchange rate lies within the exchange rate band, then the test is
CHART 1
Parity Deviations of FF/DM Exchange Rate and Twelve Month Interest Rate Differential (in percent)

1/ Eurofranc rate minus eurodeutsche mark rate.
2/ Percent deviation.

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inconclusive. 1/ Alternatively, invoking covered interest parity, the domestic interest rate under full credibility is bounded by:

\[
\left(1 + i_m^*m \right) \left( \frac{S^L_s}{S_t^L} \right)^{1/m} - 1 \leq i_t \leq \left(1 + i_m^*m \right) \left( \frac{S^U_s}{S_t^U} \right)^{1/m} - 1
\]  

where \(i_m^*m\) and \(i_m^*m\) are the domestic currency (franc) and foreign currency (DM) interest rates on assets of the same default risk and maturity \(m\), expressed as annualized rates of return. If at any time \(t\) the domestic interest rate is outside these "credibility bounds," then agents expect with positive probability that over the time to maturity \(t+m\) the exchange rate band will shift either by way of a realignment or an increase in the bandwidth.

Eurofranc interest rates for three, six, and twelve months maturity and their corresponding "credibility bounds" are shown in Chart 2. The three-month interest rate was almost always within its credibility bounds; hence, the exchange rate band may or may not have been credible. The one-year interest rate, however, was consistently above the upper bound from January 1987 to March 1990 and subsequently consistently inside the bounds. Thus, it may be inferred that until March 1990 agents expected with positive probability a devaluation of the FF/DM exchange rate. In the case of one year interest rates the test is less inconclusive as the credibility bounds are significantly narrower than for three-month interest rates. The next section outlines a more precise empirical method, due to Bertola and Svensson (1990), to extract the implicit expected rate of realignment from exchange rates and interest rate differentials.

III. A Model of the Expected Rate of Realignment

Let \(s_t\), \(s_t^L\) and \(s_t^U\) denote the natural logarithms of \(S_t\), \(S_t^L\) and \(S_t^U\), the FF/DM spot exchange rate and its lower and upper intervention rates, respectively. By definition, the exchange rate can be decomposed as:

\[
s_t = c_t + \bar{s}_t \tag{4}
\]

1/ This test of target zone credibility was first applied by Svensson (1990) to the Swedish krona and has since been applied to a number of currencies inter alia by Giovannini (1990), Koen (1991) and Geada, Saavalainen and Svensson (1992).
is the (log of the) central parity of the FF/DM exchange rate and \( s^c_t \) is the deviation of the franc from the central parity. Taking first differences of equation (4), the total expected rate of change of the franc from time \( t \) to \( t+m \), conditional on information available at time \( t \), is equal to the expected rate of realignment (i.e., the change in the central parity) plus the expected rate of change of the franc within the band:

\[
E_t \Delta s_{t+m}/m = E_t \Delta c_{t+m}/m + E_t \Delta \tilde{s}_{t+m}/m
\]  

Assuming uncovered interest parity (UIP)

\[
i_t^m - i_t^*m = E_t \Delta s_{t+m}/m
\]  

it follows that

\[
E_t \Delta c_{t+m}/m = (i_t^m - i_t^*m) - E_t \Delta \tilde{s}_{t+m}/m
\]  

UIP is an appropriate assumption if the foreign exchange risk premium is small. Theoretical support is provided by Svensson (1990), who argues that the risk premium is likely to be small in exchange rate target zones, even in the presence of devaluation risk. Empirical support of UIP for the FF/DM rate is provided by Rose and Svensson (1991), Andersen and Sorensen (1991) and, indirectly, Frankel and Phillips (1991).

From (1) and the definition of \( \tilde{s}_t \) it can be shown that the rate of change of the exchange rate within the band is bounded by:

\[
(s^L-s)/m \leq \Delta \tilde{s}_{t+m}/m \leq (s^U-s)/m
\]  

which combined with (7) gives the following maximal bounds for the expected rate of realignment:

\[
(i_t^m - i_t^*m) - (s_t^U-s_t)/m \leq E_t \Delta c_{t+m}/m \leq (i_t^m - i_t^*m) - (s_t^L-s_t)/m
\]
CHART 2
Euro-Franc Interest Rates and "Credibility Bounds"
(In percent)
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These bounds are shown as the solid lines in Charts 3 and 4. As can be seen, the bounds for the expected parity changes are wider the shorter the maturity. This reflects the fact that the maximal bounds for the expected rate of change of the exchange rate within the band are wider for shorter maturities.

IV. Estimation of Expected Exchange Rate Changes within the Band

To calculate the expected rate of realignment from (7) it is necessary to filter out expectations of exchange rate changes within the fluctuation band. As noted in section 1 above, the simplest procedure is to assume that the expected change in the exchange rate within the band is zero, that is, 

\[ E_t \Delta t + \frac{m}{m} = 0, \]

in which case the expected change in the central parity is simply equal to the interest rate differential. This case can be ruled out a priori, however, since the exchange rate within the band cannot follow a random walk. Indeed, an Augmented Dickey-Fuller test rejected the hypothesis that \( \bar{s} \) has a unit root. 1/ An alternative procedure, following Bertola and Svensson (1990), Svensson (1990, 1991), and Rose and Svensson (1991), assumes initially that the future exchange rate within the band may be well approximated by the current exchange rate. 2/ The change in the exchange rate within the band, conditional upon no realignment, may thus be estimated from:

\[
(\bar{s}_{t+} - \bar{s}_t) = \beta_0 + \beta_1 \bar{s}_t + \epsilon_t \tag{10}
\]

Estimates of the above equation are presented in Table 1 and plotted in Chart 3.

Two points about the estimation of equation (10) should be noted. One, a consequence of the target zone model is that the conditional distribution of the exchange rate within the band is heteroskedastic. Two, the projection horizons employed, \( m = 3, 6, \) and 12 months, are longer than the sampling interval of the data (monthly). The use of overlapping observations implies that the error terms will follow a moving average process of order \( m-1. \) OLS will give consistent estimates of the coefficients, but their standard errors will be inappropriate. Consequently, Generalized Method of Moment (GMM) estimates have been used for the standard errors which are robust to heteroskedasticity and serial correlation as in Newey and West (1987).

1/ The regression of \( \Delta \bar{s}_t \) on \( \bar{s}_{t-1}, \) three lags of \( \Delta \bar{s} \) and a constant yields a D-F statistic of -2.312 with a corresponding p-value of 0.46, so that the null of cointegration is accepted.

2/ Supporting evidence is also reported by Chen and Giovannini (1992).
Table 1. Estimated Expected Change in the FF/DM Exchange Rate
Within the Intervention Band, January 1987 - December 1991

(t-statistics in parentheses)

\[(\bar{s}_{t+m} - \bar{s}_t) = \beta_0 + \beta_1 \bar{s}_t + \epsilon_t\]

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>m - 3 months</th>
<th>m - 6 months</th>
<th>m - 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\beta_0)</td>
<td>0.454</td>
<td>0.768</td>
<td>1.033</td>
</tr>
<tr>
<td></td>
<td>(2.553)</td>
<td>(3.756)</td>
<td>(7.628)</td>
</tr>
<tr>
<td>(\beta_1)</td>
<td>-0.443</td>
<td>-0.732</td>
<td>-0.943</td>
</tr>
<tr>
<td></td>
<td>(-3.073)</td>
<td>(-3.792)</td>
<td>(-15.541)</td>
</tr>
</tbody>
</table>

**Summary Statistics**

<table>
<thead>
<tr>
<th></th>
<th>m - 3 months</th>
<th>m - 6 months</th>
<th>m - 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard error</td>
<td>0.577</td>
<td>0.633</td>
<td>0.550</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.269</td>
<td>0.444</td>
<td>0.652</td>
</tr>
<tr>
<td>F-stat ((\beta_1=0))</td>
<td>21.34</td>
<td>43.93</td>
<td>91.64</td>
</tr>
<tr>
<td>Number of observations</td>
<td>60</td>
<td>57</td>
<td>51</td>
</tr>
</tbody>
</table>

*Note:* The franc/deutsche mark rate within the Band (\(\bar{s}\)) is measured in percent log deviations from the franc/deutsche mark central parity. The standard errors of the coefficients are GMM estimates allowing for heteroskedastic and serially correlated error terms using the method of Newey and West (1987).
CHART 3
Expected Rate of Change of FF/DM Exchange Rate Within the Intervention Band
(In percent)
CHART 4
Bounds for Expected Rate of Realignment
of FF/DM Exchange Rate
(In percent)
The results indicate that the exchange rate within the band is mean reverting, that is, the expected exchange rate within the band is closer to the long-run mean of the exchange rate within the band the longer the time horizon. The estimated slopes are negative for all maturities, as implied by mean reversion, and are large relative to their standard errors. Moreover, the estimated slope is larger in absolute value the longer the maturity. The estimates also show that the expected change of the FF/DM exchange rate within the band has narrowed over the period January 1987 to March 1992 and has gradually turned from an expected depreciation in the early part of the period to an expected appreciation in the final part of the period (Chart 3).

An attempt was made to refine the estimates in Table 1 by the inclusion of additional explanatory variables in equation (9). First, $s^2$ and $s^3$ were included so as to capture possible nonlinearities in the relationship. These were found to be insignificant. Second, the mark-dollar interest differential for the corresponding maturity was included on the assumption that movements in it may affect the FF/DM exchange rate (Artus et al. (1991)). This too proved insignificant. The estimates in Table 1 are thus used to calculate the expected rate of realignment of the FF/DM exchange rate. These are shown in Chart 4.

V. Explaining the Expected Rate of Realignment

This section examines whether the calculated expected rate of realignment can be explained by generally observed macroeconomic variables. It is assumed that in forming expectations of a currency's

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1/ The two-step estimation procedure used in this paper, namely first estimating the expected change in the exchange rate within the intervention band and, subsequently, estimating the determinants of the expected rate of realignment (constructed by adjusting interest rate differentials for the estimates from the first step), is not the only possible estimation strategy. For instance, one could estimate simultaneously the expected change in the exchange rate within the band and the determinants of the expected rate of realignment by estimating:

$$(i_t^m - i_t^*) - (s_{t+m} - s_t)/m$$

on the rational expectations assumption that $E_t(s_{t+m} - s_t)$, conditional on no realignment, is equal to $(s_t + m - s_t)$. In this case, the disturbance of the estimated equation would include the expectations error $s_{t+m} - E_t(s_{t+m})$. The point to note is that whether in two steps or simultaneously, estimation of the expected rate of realignment requires an estimate of the expected change in the exchange rate within the band. Tests of hypotheses of the determinants of expected changes in the central parity are thus joint tests of the expected changes in the exchange rate within the band.
possible realignment, agents consider a number of factors, at home and abroad, that may induce a change in the central parity. These include such factors as inflation differentials, changes in foreign exchange reserves, fiscal developments, unemployment rates, relative money supply growth, and other macroeconomic variables. They may also include other factors which influence market sentiment, such as the authorities' perceived policy behavior or commitment.

The results of regressing the calculated expected rates of realignment on a selected set of macroeconomic variables that are believed to enter agents' information sets are shown in Table 2. For all three maturities the results are quite similar. Over 70 percent of the variation in the expected rate of devaluation is explained by the change in foreign exchange reserves, the government financing requirement (as a ratio to GDP) of France relative to Germany, the inflation differential, France's export price competitiveness relative to Germany's, the unemployment rate and, the position of the FF/DM rate within the fluctuation band. Relative money supply growth rates and the trade balance were also included, but they were found to have no additional explanatory power.

The government financing requirement and inflation variables are found to be positively related, and the competitiveness variable negatively related, to the expected rate of realignment. Thus, decreases in France's government financing requirement and in the inflation rate relative to Germany's decrease the expected rate of devaluation of the franc, as does an improvement in France's export price competitiveness relative to Germany's. The change in foreign exchange reserves enters the equations for the expected rate of realignment with the expected negative sign: an increase in reserves decreases the expected rate of devaluation. Its statistical significance, however, depends on the specification of the equation. In particular, when the unemployment rate is also included its statistical significance declines considerably. The unemployment rate itself, however, is highly significant. This raises an interesting point. In a recent paper, Drazen and Masson (1992) extend the notion of policy credibility to encompass not only the role of government policies in signaling the "type" of government (e.g., "tough," to use their terminology), but also the situation in which a government finds itself--since in very adverse circumstances even a policymaker with a reputation for being "tough" may renge on a commitment. Applied to the EMS, this suggests that the increased credibility of the EMS reflects the dominance of the signalling motive for setting policies as governments maintained their commitment not to realign. However, under the Drazen-Masson notion of credibility, expectations of realignment will also reflect pressures to increase employment and growth after a period of restrictive policies. The expected rate of devaluation will, therefore, be positively correlated with the rate of unemployment.
Table 2. Determinants of Expected Rate of Realignment based on Filtered Euromarket Interest Rate Differentials, February 1987 - November 1991 1/

(t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Variable 2/</th>
<th>Maturity</th>
<th>m = 3 months</th>
<th>m = 6 months</th>
<th>m = 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in foreign exchange reserves</td>
<td>-0.118</td>
<td>-0.097</td>
<td>-0.088</td>
<td>(-1.42)</td>
</tr>
<tr>
<td>Government financing requirement 3/</td>
<td>0.939</td>
<td>0.853</td>
<td>0.733</td>
<td>(2.86)</td>
</tr>
<tr>
<td>Inflation differential 4/</td>
<td>0.744</td>
<td>0.794</td>
<td>0.842</td>
<td>(5.36)</td>
</tr>
<tr>
<td>Export price competitiveness 5/</td>
<td>-0.245</td>
<td>-0.249</td>
<td>-0.243</td>
<td>(-5.10)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>1.284</td>
<td>1.376</td>
<td>1.400</td>
<td>(4.31)</td>
</tr>
<tr>
<td>Deviation of franc/deutsche mark rate from upper edge of band</td>
<td>1.502</td>
<td>1.256</td>
<td>0.800</td>
<td>(6.63)</td>
</tr>
</tbody>
</table>

Summary Statistics

| | Standard error | R-squared | F-statistic (6,51) | Number of observations |
| | 0.91 | 0.73 | 22.75 | 58 |
| | 0.83 | 0.76 | 26.32 | 58 |
| | 0.71 | 0.81 | 36.41 | 58 |

1/ The expected rate of realignment is defined as the France-Germany Euromarket interest rate differential minus the estimated expected rate of depreciation within the band. The standard errors of the coefficients are GMM estimates allowing for heteroskedastic and serially correlated error terms using the method of Newey and West (1987).

2/ All variables enter the estimated equations with a one period lag, except the government borrowing requirement variable which enters with a two period lag. The coefficient for the constant term is omitted.

3/ The percent ratio in government borrowing requirement to GDP in France relative to Germany.

4/ Differential in the annual rates of change of consumer prices.

5/ Annual rate of change of real exchange rate, in terms of export prices. An increase represents an improvement in France's competitiveness relative to Germany's.
The position of the exchange rate within the fluctuation band—expressed as the deviation of the FF/DM rate from the upper (weak) edge of the band—may be interpreted as capturing intangible market sentiment about the credibility of the target zone. Its statistical significance suggests that when the franc trades close to the upper intervention margin, market expectations of a realignment intensify and a devaluation risk premium is built into franc interest rates. As an alternative way of capturing market sentiment, the deviation of the FF/DM rate from the upper band was replaced in the regression equations by a dummy variable which takes increasing values as the exchange rate approaches the upper intervention margin. 1/ The results were not qualitatively different. 2/ The statistical significance of these variables suggests that the recent policy of allowing the franc to strengthen in the ERM may pay off by way of a reduction of the devaluation risk premia on French short-term interest rates. One interpretation of these results is that agents may view it as more difficult to defend by sales of reserves a currency which is close to the weak edge of the band (since reserves are limited), than it is to sterilize capital inflows when a currency is at the strong edge of the intervention margin. In the event of a shock, therefore, the country whose currency is in the weak part of the band may have to raise interest rates in order to maintain its currency within the band. If this is seen as introducing a conflict between the domestic and the exchange rate objectives of monetary policy, the credibility of the central parity may suffer.

The analysis thus far has been conducted using short-term Euromarket deposit rates. Euromarket rates have the advantage over domestic money market rates in not being affected by the existence of capital controls. Since capital controls were being phased out over the sample period, it seemed preferable to use Euromarket rates. 3/ Euromarket rates are not available for long maturities, however, and the latter have the advantage that the expected rate of mean reversion of the exchange rate within the band becomes very small at long horizons. 4/ Since $E_t\Delta \overline{S}$ is bounded, the term $E_t\Delta \overline{S}_{t+m}/m$ in equation (7) becomes progressively smaller as the

---

1/ Specifically, the dummy variable was defined to take values of one when the FF/DM rate is in the top half of the intervention band, two when it is in the top quarter, and three when it is in the top eighth.

2/ The estimated coefficients on the dummy variable (with t-statistics in parentheses) in the equations using the three, six, and twelve month interest rates, respectively, are 1.205 (6.89), 1.00 (6.41) and 0.66 (5.33).

3/ Regulations other than capital controls, political and default risk, information and transaction costs and other factors may also introduce a wedge between domestic market and Euromarket rates. Changes in domestic market rates may, therefore, be due to actual or anticipated changes in these characteristics rather than in exchange risk. Empirically, however, capital controls have been found to constitute the major explainable component of spreads between Euromarket and domestic market rates.

4/ The results in section 4 above, indicate that the expected rate of mean reversion decreases as the horizon lengthens.
forecast horizon lengthens, so that the expected rate of devaluation is well approximated by the interest differential.

Table 3 reports the results of regressing the differential in the yield on long-term government bonds on the same set of macroeconomic variables used in the equations for the expected rate of realignment derived from Euromarket rates. The results are broadly similar. The inflation rate, competitiveness and the unemployment rate are again the major factors influencing devaluation expectations. The relative government financing requirement is not as significant as in the regression equations based on short-term rates, however, and the market sentiment variables are insignificant. This last result is not surprising, as the current position of the franc in the intervention band should be of little relevance in forming expectations of exchange rates several years hence: views of the long-term viability of the central rate are shaped by the unfolding of more fundamental economic factors.

VI. Conclusions

The differentials between French and German interest rates have narrowed considerably since the EMS realignment in January 1987 as the franc/deutsche mark exchange rate band has become increasingly credible. Expectations of realignments of the central parity have been found to be influenced by the evolution of fundamental economic factors such as inflation differentials, competitiveness, unemployment, government financing requirements, and foreign reserves. France's favorable economic performance, especially as regards inflation, the external position, and fiscal situation has allowed the implicit expected rate of devaluation to decrease considerably. The results further suggest that the devaluation risk premium on franc interest rates could be reduced further and differentials with respect to Germany additionally narrowed by an improved labor market performance and, in the case of short-term rates, by a strengthened position of the franc in the ERM band.
Table 3. Determinants of Expected Rate of Realignment based on Long-Term Interest Rate Differential, February 1987 - November 1991
(t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in foreign exchange reserves</td>
<td>-0.123</td>
<td>-0.055</td>
</tr>
<tr>
<td></td>
<td>(-2.21)</td>
<td>(-1.37)</td>
</tr>
<tr>
<td>Government financing requirement</td>
<td>0.562</td>
<td>0.179</td>
</tr>
<tr>
<td></td>
<td>(1.73)</td>
<td>(1.25)</td>
</tr>
<tr>
<td>Inflation differential</td>
<td>0.967</td>
<td>0.538</td>
</tr>
<tr>
<td></td>
<td>(8.17)</td>
<td>(9.55)</td>
</tr>
<tr>
<td>Export price competitiveness</td>
<td>-0.150</td>
<td>-0.169</td>
</tr>
<tr>
<td></td>
<td>(-2.90)</td>
<td>(-8.44)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td></td>
<td>1.065</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.52)</td>
</tr>
<tr>
<td>Deviation of franc/deutsche mark rate from upper edge of band</td>
<td>0.086</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.61)</td>
<td></td>
</tr>
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</table>

Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard error</td>
<td>0.52</td>
<td>0.34</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.80</td>
<td>0.92</td>
</tr>
<tr>
<td>F-statistic (5,52)</td>
<td>41.49</td>
<td>116.41</td>
</tr>
<tr>
<td>Number of observations</td>
<td>58</td>
<td>58</td>
</tr>
</tbody>
</table>

Note: Interest rates are yields on 7-10 year government bonds. Method of estimation is OLS; robust standard errors are estimated using a spectral density kernel. The coefficient for the constant term is omitted. Variables are defined as in Table 2.
Data Sources


Exchange rate: IMF, (average of daily observations).


Gross domestic product: IMF, International Financial Statistics, line 99b.c for France, line 99a.c for Germany, (monthly values are obtained by interpolating on industrial production index).


Unemployment rate: OECD, Analytical Database.
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