This paper examines the credibility of the exchange rate policy pursued by the Belgian monetary authorities of pegging the Belgian franc to a narrow fluctuation band around the deutsche mark, in the context of the exchange rate mechanism of the European Monetary System. Simple interest rate corridor analysis, based on the Belgian-German long-term interest rate differential and taking explicit account of the currency's position within its fluctuation band, would appear to suggest that the hypothesis that long-run exchange rate credibility has been attained should be rejected, even though considerable progress has been made in this regard since the early 1980s. The paper proceeds to decompose the Belgian-German interest rate differential into a sovereign credit risk and an exchange rate risk component, via the modelling of inflationary expectations, and concludes that long-run exchange rate credibility cannot be rejected from 1990 onwards.

JEL Classification Numbers:
E43, F31, F33

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Summary

The Belgian franc has been a member of the exchange rate mechanism of the European Monetary System since its inception in 1979. Following frequent downward realignments of the currency during the first half of the 1980s, Belgium pursued a progressively tighter exchange rate policy, and in May 1990 the monetary authorities announced their objective to tightly peg the Belgian franc to the strongest currency within the system.

This paper addresses the question whether long-run exchange rate credibility for the Belgian franc over the period 1982-92 has been attained. The starting point of the analysis is the interest rate corridor methodology introduced by Svensson (1990). This approach assumes that uncovered interest rate parity holds, and it takes explicit account of the currency's position within its fluctuation band in testing for exchange rate credibility. Tests along the lines of the interest rate corridor method suggest that despite substantial progress, long-run exchange rate credibility for the Belgian franc can be rejected throughout the period under discussion.

The remainder of the paper explores the sensitivity of this result to the strong assumption of interest rate parity. In addressing this issue, the determinants of the Belgian-German long-term interest rate differential are examined in detail. This differential turns out to be significantly affected by relative inflation (or relative competitiveness) and by fiscal variables (both the relative debt-to-GDP ratio and primary deficit-to-GDP ratio) in the usual ways. In addition, devaluations of the Belgian franc vis-à-vis the deutsche mark appear to have resulted in a significant widening of the differential over the short term, while the announcement of the hard currency policy appears to have led to a narrowing of the differential. Variables such as the unemployment rate and the external balance do not appear to significantly affect the differential, suggesting that the monetary authorities are perceived to attach a relatively low weight to these objectives.

The paper then breaks down the impact of the fiscal variables into an exchange rate risk and a sovereign credit risk component, by explicitly modeling inflationary expectations. The resulting adjustment in the interest rate corridors reveals that long-run exchange rate credibility cannot be rejected from mid-1990 onward.
I. Introduction

In this paper, we address the question of the credibility of Belgium's exchange rate policy within the European Monetary System (EMS), over a period ranging from the early 1980s almost until the widening of the EMS fluctuation bands in August 1993. During the period under discussion, the general trends of the Belgian franc exchange rate have exhibited significant variation. Over the first half of the period, devaluations of the Belgian franc vis-à-vis the deutsche mark, either unilateral (as in February 1982) or as part of general EMS realignments, had been frequent. On the other hand, since January 1987, the Belgian franc-deutsche mark central parity has remained unchanged.

Belgium has been a member of the exchange rate mechanism of the EMS since its inception in 1979, with the Belgian franc placed in the narrow ±2.25 percent fluctuation band. Since May 1990, Belgium's foreign exchange policy stance has hardened further, as the monetary authorities announced that the Belgian franc will closely track the strongest currency within the system ("franc fort" policy). Since then, and until the widening of the EMS fluctuation bands from 2.25 percent to 15 percent in August 1993, Belgian franc fluctuations vis-à-vis the deutsche mark have been negligible, generally limited to a ± 0.5 percent band (Chart 1).

Given Belgium's status as a small, open economy, exchange rate policy constitutes an important element of its anti-inflation strategy. From a theoretical standpoint, economies such as Belgium are often viewed as suffering from a credibility problem of the type analyzed by Barro and Grossman (1983). In particular, it can be argued that, in pursuing an independent monetary policy, it is very difficult to adhere to a policy rule that can be regarded as time-consistent. Under these conditions, it can be shown that the rational expectations equilibrium is characterized by a rate of inflation higher than the socially optimal level. Giavazzi and Pagano (1988) argue that such countries can overcome this credibility problem by giving up monetary policy independence and pegging their currencies to a currency such as the deutsche mark, as this would effectively allow them to "borrow" the Bundesbank's anti-inflation reputation. This argument implicitly assumes that the costs involved in reneging on such a policy are perceived to be prohibitively high.

The purpose of this paper is to test whether exchange rate credibility has been attained. In the process and as a related matter, we will examine the determinants of interest rate differentials between Belgium and Germany.

Interest rate differentials are an indicator traditionally employed to assess exchange rate credibility. Chart 2 depicts the trends in the long- and short-term Belgian-German interest rate differentials over the period 1982-92.

Chart 2 provides strong prima facie evidence that Belgium has made spectacular progress in strengthening the credibility of its exchange rate
policy during the period under discussion. The long-term rate differential has declined from around 5 percent in 1982 to around 0.7 percent, while the short-term money market rate differential, which stood at almost 5 percent in 1982, has practically disappeared.

Suggestive as the trends in Chart 2 may be, they fail to provide a conclusive test of exchange rate credibility. In general, the use of interest rate differentials as an indicator of exchange rate credibility in the context of a target zone setting suffers from two important limitations: on the one hand, it fails to consider the currency's position within its fluctuation band; on the other hand, it does not take account of the fact that the critical level of the interest rate differential at which credibility can be rejected varies with the length of the time horizon over which the credibility test is being conducted, even if securities of appropriate maturity are chosen. Both of these factors turn out to be important components of an adequate exchange rate credibility test.

II. Interest Rate Corridors

An attractive way that has been proposed to overcome the above problems generated by the use of the interest rate differential as indicator of exchange rate credibility is the "interest rate corridor" approach. \(^1/\)

This method takes explicit account of the level of the exchange rate, as well as the relevant time horizon.

The underlying rationale for the concept of interest rate corridors is very straightforward. Consider an N-month security denominated in deutsche marks. The annualized ex post Belgian franc rate of return \(R^N_t\) on an investment in this security can be expressed as:

\[
R^N_t = (1+i^*_N) \left(\frac{e^t+N}{e^t}\right)^{12/N}
\]

where \(i^*_N\) is the nominal interest rate of the security and \(e\) is the Belgian franc/deutsche mark spot exchange rate.

A credible exchange rate zone implies that the exchange rate is expected to fluctuate within a band: \(^2/\)

---

\(^1/\) The interest rate corridor method was introduced by Svensson (1990) for the case of the Swedish krona. It was applied to the case of the Belgian franc by Koen (1991).

\(^2/\) In the case of a narrow-band ERM currency like the Belgian franc the appropriate limits are defined as ± 2.25 percent of the currency's central rate.
CHART 1
BELGIUM
Recent Evolution of Exchange Rates

BF/DM Exchange Rate
(Normalized by the Central ERM Parity)

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CHART 2
BELGIUM

Interest Rate Differentials vs. Germany

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In the context of perfect capital mobility, and assuming no unexploited arbitrage opportunities at equilibrium, credibility of the exchange regime implies that the interest rate of a Belgian franc-denominated security is constrained to move within a corridor:

\[ \bar{i}_t < i_t < 
\]

whose upper and lower bounds can be directly derived from (1), as follows:

\[ \bar{i}_t = (1 + \bar{e}_t^N)(\frac{\bar{e}}{e_t})^{12/N} - 1 ; \quad i_t = (1 + \bar{e}_t^N)(\frac{\bar{e}}{e_t})^{12/N} - 1 \]

Two points regarding the above interest rate corridors are immediately apparent. First, for a given German interest rate, a rise in e (i.e., a weakening of the Belgian franc vis-à-vis the deutsche mark) shifts the interest rate corridor down; this is a consequence of the fact that, assuming exchange rate credibility, the weaker the domestic currency, the higher its potential appreciation and the lower its potential depreciation. Second, the shorter the time horizon, the greater the width of the interest rate corridor, since the potential appreciation or depreciation per unit of time increases.

In using the concept of interest rate corridors to assess exchange rate credibility, a fundamental asymmetry of the test should be kept in mind. While a domestic interest rate above the corridor should clearly lead to a rejection of the hypothesis that credibility has been attained, a domestic interest rate inside the corridor does not necessarily imply credibility: while the credibility hypothesis cannot be rejected, one also cannot reject the hypothesis of an expected downward realignment of the domestic currency (upward shift in the interest rate corridor), such that the domestic interest rate would remain inside the new corridor.

Chart 3 depicts Belgian interest rate corridors for a five-year horizon (using the government bond yield as the relevant interest rate) and for a three-month horizon (using the money market rate as the relevant interest rate). It is evident from Chart 3 that short-run credibility cannot be rejected, even assuming a very narrow implicit exchange rate fluctuation band of ± 0.5 percent around the deutsche mark following the adoption of the "franc fort" policy. At the same time, it is clear that credibility did not come overnight: there are extended periods prior to 1986 for which the attainment of even short-run credibility is rejected.

On the other hand, the hypothesis of long-run credibility (at the five-year horizon) is rejected for the entire period under discussion, even though the Belgian long-term rate has been consistently approaching the
upper bound of its interest rate corridor over time. Thus, in line with Koen's conclusions, simple interest rate corridor analysis indicates that the Belgian hard currency policy is not yet credible for the long run, possibly reflecting fundamental questions regarding the credibility of overall economic management and the sustainability of the convergence of Belgium's economic fundamentals toward Germany's.

A major problem with simple interest rate corridor analysis is that it relies on the strong assumption of uncovered interest rate parity: it assumes, in other words, that interest rate differentials reflect exclusively the expectation of exchange rate changes. To address this problem we shall have to examine in more detail the determinants of interest rate differentials. This analysis will lead us to a redefinition of the interest rate corridors appropriate for testing long-run exchange rate credibility.

III. Simple Models of Interest Rate Differentials

As a starting point for the study of long-term interest rate differentials (RB) between the domestic and a foreign country, the following could be included as explanatory variables: the inflation differential between the two countries (INFL), the debt-to-GDP ratio differential between the two countries (DEBT), and a time trend term (TIME) capturing among other things, changes in exchange rate credibility over time.

For the specific case of Belgian-German interest rate differentials, the following variables are also included: a (0,1) dummy variable of general exchange rate realignments, not necessarily involving the Belgian franc (REAL), and a devaluation variable (DEV) capturing the percentage point changes in the Belgian franc/deutsche mark central rate, whether as part of a general or unilateral realignment. The hypothesis to be tested is whether REAL or DEV had any impact on interest rate differentials over the contemporaneous and two succeeding quarters. In addition, we include an exchange rate regime term (REG), taking on the value 2.25 percent up to the second quarter of 1990 and 0.5 percent thereafter, to capture the impact of the announcement of the "franc fort" policy.

The REAL and DEV terms warrant some further discussion. The rationale for including the REAL term is that, to the extent that a general realignment raises questions about the stability of the ERM itself, we might expect as a result flows out of the perceived "weak" currencies toward the perceived "strong" currencies of the system. Inclusion of the DEV term enables us to distinguish between two conflicting hypotheses: on the one hand, it can be argued that, to the extent that the new level of the central rate is perceived by the markets to be more sustainable, long-term support of the new parity may be achieved at a lower interest rate, enabling a reduction in long-term rate differentials, thus implying a negative coefficient. On the other hand, to the extent that a devaluation reveals information about the monetary authorities' reaction function and, in particular, to the extent that the markets view the devaluation as an
CHART 3
BELGIUM
Interest Rate Corridors

Long Term – Bond Yield

Three Month Horizon – Money Market Rate

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indication that the domestic monetary authorities may again resort to this measure in the future in response to adverse trends in competitiveness or the real economy, they may require a larger interest rate differential in order to hold domestic currency denominated assets, thus implying a positive DEV coefficient.

The estimation results for the period 1982-92, using quarterly data, were as follows (t-statistics in parenthesis):

\[
\begin{align*}
RB &= 0.446 \text{ INFL} + 0.040 \text{ DEBT} - 0.0008 \text{ REAL} + 0.150 \text{ DEV} - 0.057 \text{ REG} - 0.0007 \text{ TIME} \\
& \quad (4.20) \quad (2.44) \quad (0.37) \quad (2.79) \quad (0.22) \quad (1.92) \\
R^2 &= 0.85 \\
R^2 &= 0.83 \\
F (6,38) &= 35.7 \\
SE &= 0.0060
\end{align*}
\]

\[
\begin{align*}
\text{DW(1)} &= 1.73 \\
\text{DW(4)} &= 1.95
\end{align*}
\]

Keeping in mind the very simple formulation of the above equation, the main conclusions from the estimation results are as follows: The coefficients of the INFL and DEBT terms have the expected sign and are statistically significant. It should be noted however, that the INFL coefficient is significantly less than one, indicating that, other things equal, the monetary authorities are expected to accommodate via a future devaluation only around 45 percent of current inflation differentials. The REAL coefficient is negative but its significance level is low, thus lending limited support to the notion that for most of the period under discussion the Belgian franc was regarded on balance as a "strong" currency. The DEV coefficient is positive and statistically significant, indicating that a 10 percent devaluation of the Belgian franc central rate relative to the deutsche mark raises the Belgian-German long-term interest rate differential by around 1.5 percentage points over the next three quarters. The REG coefficient turns out to be insignificantly different from zero, thus failing to capture any impact of the "franc fort" policy. This is somewhat surprising, given the importance that the Belgian authorities have attached to the hardening of the exchange rate policy stance in enhancing overall policy credibility. In fact, a refinement of the specification of the above equation in the subsequent sections of this paper, especially with regard to the fiscal variables and the formulation of inflationary expectations, reverses the conclusions regarding the significance of the REG coefficient. Finally, the TIME coefficient turned out to be negative and statistically significant, lending support to the hypothesis of a gradual improvement of credibility during the period under consideration.

Closer analysis of the INFL term highlights the notion of two alternative versions of credibility: On the one hand, a case where the coefficient of the inflation differential is equal to zero could indicate "strong" exchange rate credibility, in the sense that the monetary authorities are viewed as willing to successfully defend the central parity even in the presence of a positive inflation differential. On the other hand, a situation where the INFL coefficient turns out to be positive could still be consistent with a weaker version of credibility: while the
domestic monetary authorities are regarded as prone to (at least partially) accommodate any inflation differential by an exchange rate adjustment, they could still be viewed as credibly pursuing policies leading to a sustainable convergence of inflation rates over time.

In view of the estimation results presented above and the evidence from the interest rate corridors of Chart 3, it could be argued that Belgium's experience may be interpreted as consistent with (or at least approaching) the weak version of long-run exchange rate credibility. This point is brought out more clearly if Belgium's experience is contrasted with that of two comparable countries, the Netherlands and Austria. 1/

For the Netherlands the estimation results are as follows:

\[
RB = 0.028 \text{ INFL} + 0.028 \text{ DEBT} + 0.001 \text{ REAL} - 0.0003 \text{ TIME} + 0.096 \text{ DEV} \\
(0.55) \quad (3.30) \quad (0.39) \quad (2.44) \quad (0.96)
\]

\[
R^2 = 0.76 \quad R^2 = 0.72 \quad F(6, 34) = 17.5 \quad SE = 0.0018
\]

\[
DW(1) = 2.25 \quad DW(4) = 1.84 \quad \hat{\rho}_1 = +0.656(t=5.36)
\]

For Austria, the estimation results are as follows:

\[
RB = 0.056 \text{ INFL} + 0.061 \text{ DEBT} + 0.005 \text{ REAL} - 0.0004 \text{ TIME} \\
(0.78) \quad (2.96) \quad (3.00) \quad (2.46)
\]

\[
R^2 = 0.79 \quad R^2 = 0.76 \quad F(5, 30) = 22.7 \quad SE = 0.0027
\]

\[
DW(1) = 1.95 \quad DW(4) = 1.92 \quad \hat{\rho}_1 = +0.857(t=7.22)
\]

The result that the INFL coefficient turns out to be insignificantly different from zero in the above cases suggests that both the Netherlands and Austria may be viewed as falling under the "strong" exchange rate credibility category. While it might be objected that the fiscal variable (whose coefficient turns out to be statistically significant) could be viewed as a (partial) predictor of future inflation differentials, it is very hard to theoretically justify the anticipation of future exchange rate adjustment in response to higher future inflation, as nonadjustment of rates today in response to current inflation differentials indicates that the markets do not expect the monetary authorities to be willing to accommodate current inflation differentials by future exchange rate adjustment.

Finally, it is possible to test whether Belgium has been moving from the weak towards the strong version of exchange rate credibility during the

---

1/ Even though the latter is not a member of the EMS, it is widely viewed as following a policy of informally pegging its currency to the DM since the late 1970s.
period under consideration. To do this, we allow the coefficient of INFL to change monotonically over time:

$$\text{RB} = (a_0 + a_1 \times \text{TIME}) \times \text{INFL} + b \times \text{DEBT} + c \times \text{REAL} + d \times \text{DEV} + e \times \text{REG} + f \times \text{TIME}$$

The estimation results are as follows:

$$\begin{align*}
\text{RB} &= 0.549 \times \text{INFL} + 0.045 \times \text{DEBT} - 0.0001 \times \text{REAL} + 0.080 \times \text{DEV} - 0.014 \times \text{REG} \\
&\quad - 0.0009 \times \text{TIME} - 0.015 \times \text{INFL} \times \text{TIME} \\
\text{R}^2 &= 0.93 \quad \hat{R}^2 = 0.91 \quad F(9,33) = 47.8 \quad SE = 0.0042 \\
\text{DW(1)} &= 2.00 \quad \text{DW(4)} = 1.84 \quad \hat{\rho}_1 = +0.709(t=3.80) \quad \hat{\rho}_2 = -0.182(t=1.84)
\end{align*}$$

The coefficient of the INFL*TIME term turns out to be statistically significant and opposite in sign relative to the INFL coefficient, thus indicating that Belgium has been moving towards the strong version of exchange rate credibility over time during the period under consideration.

IV. Refining the Fiscal Variables

The specification of the fiscal variables in the simple model of the previous section raises a number of objections. First, it can be argued that it yields an estimate of the impact of the domestic fiscal stance on interest rate differentials that is unrealistically large. In particular, the estimation results of the previous section indicate that a reduction in Belgium’s debt-to-GDP ratio to the standards set by the Maastricht agreement, which would roughly imply its equalization relative to Germany in gross terms, would result in a fall in the Belgian-German long-term interest rate differential by almost 3 percentage points. Second, it could be objected from a more theoretical standpoint that the specification of the previous section is excessively backward-looking, in the sense that it takes account of accumulated debt, but not of the current stance of fiscal policy.

As a partial remedy for the above shortcomings, the current primary deficit-to-GDP ratio differential (DEFFPR) was also included in the equation to be estimated. The estimation results are as follows:
RB = 0.447 INFL + 0.024 DEBT + 0.270 DEFPR - 0.0020 REAL + 0.172 DEV
     (3.75) (2.25) (2.54) (1.03) (2.09)
+ 0.456 REG - 0.0005 TIME - 0.009 INFL*TIME
     (1.90) (1.17) (1.86)

R^2 = 0.93  R^2 = 0.92  F (11,30) = 36.2  SE = 0.0041

DW(1) = 1.80  DW(4) = 1.93  \hat{\rho}_1 = +0.691(t=3.20)  \hat{\rho}_2 = -0.173(t=1.88)
\hat{\rho}_3 = -0.185(t=1.99)

These results suggest a smaller impact of the DEBT term, whose coefficient
remains statistically significant, while the DEFPR coefficient is also
statistically significant. In addition, the REG coefficient turns out
statistically significant and with the right sign, while the hypothesis that
the TIME coefficient is equal to zero can no longer be rejected at
conventional significance levels. Otherwise, the implications of the
previous section remain unaffected. Dropping the statistically
insignificant terms from the regression yields the following estimation
results:

RB = 0.454 INFL + 0.017 DEBT + 0.285 DEFPR + 0.098 DEV - 0.0085 INFL*TIME
     (2.52) (3.02) (2.44) (2.16) (2.04)
+ 0.416 REG
     (2.29)

R^2 = 0.93  R^2 = 0.92  F (9,32) = 43.7  SE = 0.0041

DW(1) = 1.85  DW(4) = 1.98  \hat{\rho}_1 = +0.609(t=3.07)  \hat{\rho}_2 = -0.126(t=1.90)
\hat{\rho}_3 = -0.119(t=1.94)

V. Interpretation of the INFL Term

In examining the INFL term more closely, we must empirically
distinguish between two conflicting interpretations:

a. The first interpretation is based on the assumption that
inflationary expectations are fully adaptive; accordingly, the current
inflation differential (possibly together with a distributed lag of past
inflation differentials which was not included in the specification of the
previous sections) may be viewed as a good predictor of future inflation
differentials. In that case, the current inflation differential should
retain explanatory power even if other relevant current variables (e.g.
relative competitiveness) are included, at least to the extent that
expectations of future inflation are important in explaining current interest rate differentials.

b. According to the second interpretation, the current inflation differential is not an adequate predictor of future inflation differentials, and its significance in the previous estimated equations results purely from its correlation with other contemporaneous (or past) relevant variables (e.g., relative competitiveness). In that case, the above equations suffer from mis-specification in a double sense: first, in not including the "true" current (or past) explanatory variables; and second, to the extent that inflationary expectations matter, in not including a correctly defined expected inflation term.

To test interpretation (a), we included a relative competitiveness term (COMP), along with INFL, in the equation to be estimated. COMP is defined as the difference in the annualized rate of change of the real effective exchange rate index, computed on the basis of unit labor costs, between Belgium and Germany (an increase in COMP signifies an improvement in relative competitiveness). The estimation results are as follows:

\[
\begin{align*}
RB &= -0.041 \text{ INFL} + 0.017 \text{ DEBT} + 0.508 \text{ DEFPR} - 0.096 \text{ COMP} - 0.0009 \text{ REAL} \\
&\quad + 0.188 \text{ DEV} + 0.410 \text{ REG} - 0.0004 \text{ TIME} + 0.0085 \text{ INFL*TIME} \\
\end{align*}
\]

\[
\begin{align*}
(0.20) & \quad (1.94) & \quad (4.46) & \quad (3.77) & \quad (0.50) \\
(2.56) & \quad (1.95) & \quad (0.78) & \quad (1.03) \\
\end{align*}
\]

\[
\begin{align*}
R^2 &= 0.95 & \quad R^2 &= 0.94 & \quad F (11,30) &= 52.9 & \quad SE &= 0.0035 \\
DW(1) &= 2.01 & \quad DW(4) &= 2.08 & \quad \hat{\rho}_1 &= +0.427(t=2.41) & \quad \hat{\rho}_3 &= -0.321(t=2.18) \\
\end{align*}
\]

The coefficient of the COMP term turns out to be statistically significant, and to have the right sign. On the other hand, the INFL term loses all explanatory power, with its coefficient not significantly different from zero. Consequently, interpretation (a) can be rejected: the current inflation differential is not an adequate indicator of expected inflation, at least to the extent that inflationary expectations matter in explaining current interest rate differentials.

After dropping the inflation terms along with the other statistically insignificant variables, and allowing the COMP coefficient to change monotonically over time, the estimation results are as follows:

\[
\begin{align*}
RB &= -0.041 \text{ INFL} + 0.017 \text{ DEBT} + 0.508 \text{ DEFPR} - 0.096 \text{ COMP} - 0.0009 \text{ REAL} \\
&\quad + 0.188 \text{ DEV} + 0.410 \text{ REG} - 0.0004 \text{ TIME} + 0.0085 \text{ INFL*TIME} \\
\end{align*}
\]

\[
\begin{align*}
(0.20) & \quad (1.94) & \quad (4.46) & \quad (3.77) & \quad (0.50) \\
(2.56) & \quad (1.95) & \quad (0.78) & \quad (1.03) \\
\end{align*}
\]

\[
\begin{align*}
R^2 &= 0.95 & \quad R^2 &= 0.94 & \quad F (11,30) &= 52.9 & \quad SE &= 0.0035 \\
DW(1) &= 2.01 & \quad DW(4) &= 2.08 & \quad \hat{\rho}_1 &= +0.427(t=2.41) & \quad \hat{\rho}_3 &= -0.321(t=2.18) \\
\end{align*}
\]

1/ These results are not affected if the COMP variable is replaced by the Belgian-German ratio of the level of competitiveness, as defined by the respective real effective exchange rate indices.
RB = 0.023 DEBT + 0.418 DEFFPR - 0.086 COMP + 0.153 DEV + 0.456 REG
(8.01) (12.12) (4.03) (3.00) (4.31)
+ 0.0014 COMP*TIME
(1.83)

\[ R^2 = 0.95 \quad R^2 = 0.94 \quad F (8, 33) = 70.3 \quad SE = 0.0036 \]

\[ DW(1) = 1.94 \quad DW(4) = 1.98 \quad \hat{\rho}_1 = -0.482(t=3.14) \quad \hat{\rho}_3 = -0.317(t=2.42) \]

Based on the \( R^2 \) and standard error, it can be concluded that the specification of the above equation is indeed more satisfactory relative to the equations which include INFL but not COMP. The coefficient of the COMP*TIME term is opposite in sign to that of the COMP term, again revealing that Belgium has been moving from weak towards strong exchange rate credibility, albeit at a slower pace relative to what the previous equations were suggesting. 1/

VI. Interpretation of the Fiscal Variables

Up to now, we have not discussed the interpretation of the presence of the fiscal variables in the estimated equations. This question turns out to be at the heart of devising an appropriate test to assess exchange rate credibility. Two alternative interpretations are usually offered to explain the significance of fiscal variables in explaining long-term inflation differentials:

a. According to the first interpretation, the significance of the fiscal variables should be entirely attributed to their role as (at least partial) predictors of future inflation. In that case, interest rate parity holds, and the simple interest rate corridors of Section I provide an adequate test of exchange rate credibility.

b. According to the second interpretation, while part of the significance of the fiscal variables in explaining interest rate differentials could indeed relate to inflationary expectations, it may also derive from other factors (e.g., sovereign credit risk) which should in principle be entirely unconnected with expected future exchange rate movements. In that case, interest rate parity does not hold, and the simple interest rate corridors of Section II have to be adjusted in order to provide a useful test of exchange rate credibility.

The argument on which interpretation (a) is based is that the persistence of a substantial debt and/or budget deficit could create the

---

1/ By contrast, the Netherlands and Austria once again can be shown to exhibit strong exchange rate credibility, with the COMP coefficient insignificantly different from zero.
incentive for the monetary authorities to engage in monetary financing in
the future, thus raising inflationary expectations. Given that the
estimation results of the previous sections indicate that current
discrepancies in relative competitiveness cause long-term interest rate
differentials, this prospect of higher inflation differentials, and
therefore deterioration in relative competitiveness, in the future should
also be reflected in higher interest rate differentials today.

While this point is certainly valid, even if one takes into account the
limitations on the monetary financing of budget deficits imposed by the
Maastricht agreement, interpretation (a) proceeds to view sovereign credit
risk for western European countries as minimal, even in the case of
substantial fiscal imbalances.

This second part of the argument is questionable. Even if outright
default in the case of the above countries could in fact be ruled out, 1/
weaker forms of sovereign credit risk may still be present. In particular,
some types of debt rescheduling, particularly with regard to domestic
institutional holders of government debt, are not unusual for EC countries.
In addition, and perhaps even more relevant, individual countries retain
taxation powers, and it is thus reasonable to assume that the market may be
discounting the possibility of higher withholding taxes in the future, in
response to major fiscal imbalances. These factors would also result in
interest rate differentials, quite independently of expected future exchange
rate movements.

VII. Inflationary Expectations

To empirically distinguish between the two interpretations of the
previous section, we need to explicitly introduce inflationary expectations
into the model.

It is assumed that economic agents, in forming their expectations of
future inflation, take into account the past history of inflation, fiscal
variables, and money supply growth (MON). In particular, in making an
"optimal" prediction of inflation, they are assumed to make use of a "best-fit"
equation linking present inflation differentials to a distributed lag
of the above independent variables.

It should be emphasized that this methodology of modelling inflationary
expectations may be vulnerable to the "peso problem", which has been

1/ It should be pointed out however that, in contrast to other European
countries, uncertainty over the constitutional future of Belgium, and the
related recent proposals in favor of allocating the central government debt
to the regional governments could be relevant sources of credit risk. For a
discussion of these issues, see the central bank’s views as reported in the
analyzed by Krasker (1980). This problem arises when large exchange rate adjustments are expected to occur infrequently, i.e. market participants attach to them a low probability per unit of time. Under these conditions, it can be shown that the probability that sample averages match "true" expectations is very low, even in medium-size samples like the one under consideration. This situation is likely to be particularly relevant in a setting where the monetary authority is perceived a mixture of fixed exchange rate and discretionary strategy of an "escape clause" type, studied by Flood and Isard (1989) and Cukierman (1990), which can be regarded as an attractive formalization of a system of fixed but adjustable exchange rates. Under this strategy, the fixed exchange rate is expected to be maintained if shocks fall within a certain range, and to be abandoned if they fall outside that range. 1/

We present below the estimation results of such an equation, dropping all variables whose coefficients turned out to be statistically insignificant, and using broad money M2 as the relevant monetary aggregate. 2/

\[
\begin{align*}
\text{INFL} & = 0.059 + 0.943 \text{INFL}(-1) - 0.324 \text{INFL}(-3) + 0.067 \text{DEBT}(-1) \\
& \quad - 0.030 \text{DEBT}(-3) + 0.033 \text{DEBT}(-4) + 0.271 \text{DEFPR}(-1) + 0.267 \text{DEFPR}(-2) \\
& \quad + 0.031 \text{MON}(-1) - 0.045 \text{MON}(-3) + 0.045 \text{MON}(-4) \\
\end{align*}
\]

\[
\begin{align*}
(4.36) & \quad (8.55) & \quad (2.86) & \quad (2.81) \\
(1.88) & \quad (1.92) & \quad (2.41) & \quad (1.87) \\
(2.87) & \quad (2.81) & \quad (2.83) \\
\end{align*}
\]

\[R^2 = 0.98 \quad R^2 = 0.98 \quad F (10, 29) = 159.2 \quad SE = 0.0029\]

To test the two hypotheses of the previous section, we include the predicted inflation differential from the above regression (INFLPR) as an independent variable into the equation for the long-term interest rate differential. According to hypothesis (a), the fiscal variables, apart from their impact on expected inflation, should have no additional explanatory power. According to hypothesis (b), the coefficient of the fiscal

1/ On the other hand, Radaelli's (1987) conclusions from the study of movements in European onshore-offshore interest rate differentials, suggesting that market participants may have been reasonably accurate in forecasting the timing of realignments, can be interpreted as a partial indication that the bias resulting from the peso problem may have been rather small in the case of EMS countries. Also, Dornbusch (1989) points to the the flatness of the yield curve, whose slope in fact turned negative for many EMS countries, including Belgium, after 1990, as evidence that the peso problem may not be substantial.

2/ Using M1 resulted in somewhat lower coefficient significance levels; the conclusions turn out to be unaffected by the choice of monetary aggregate.
variables, while lower than the estimates of the previous sections, should still turn out to be statistically significant.

\[
\begin{align*}
RB &= 0.304 \text{ INFLPR} + 0.018 \text{ DEBT} + 0.313 \text{ DEFPR} - 0.053 \text{ COMP} + 0.0005 \text{ REAL} \\
&+ 0.215 \text{ DEV} + 0.366 \text{ REG} + 0.0001 \text{ TIME} + 0.0022 \text{ COMP*TIME} \\
R^2 &= 0.95 \\
R^2 &= 0.93 \\
F(11,25) &= 43.6 \\
\text{SE} &= 0.0032 \\
\text{DW}(1) &= 1.96 \\
\text{DW}(4) &= 1.94 \\
\hat{\beta}_1 &= +0.307(t=2.17) \\
\hat{\beta}_4 &= -0.195(t=1.92)
\end{align*}
\]

Dropping the statistically insignificant variables, the estimation results are as follows:

\[
\begin{align*}
RB &= 0.283 \text{ INFLPR} + 0.019 \text{ DEBT} + 0.319 \text{ DEFPR} - 0.051 \text{ COMP} + 0.192 \text{ DEV} \\
&+ 0.276 \text{ REG} + 0.0021 \text{ COMP*TIME} \\
R^2 &= 0.95 \\
R^2 &= 0.94 \\
F(9,27) &= 57.1 \\
\text{SE} &= 0.0031 \\
\text{DW}(1) &= 1.96 \\
\text{DW}(4) &= 1.90 \\
\hat{\beta}_1 &= +0.359(t=2.28) \\
\hat{\beta}_4 &= -0.205(t=1.93)
\end{align*}
\]

The main results from the above estimation can be summarized as follows:

a. The constant term turned out to be statistically insignificant, and was dropped from the regression. There is no evidence of a "structural" long-term interest rate differential between Belgium and Germany, emanating from imperfections in capital flows, imperfect asset substitutability due to, for example, different liquidity characteristics, or other factors.

b. Expected inflation turns out to be statistically significant, despite the presence of a contemporaneous competitiveness term. The statistical significance of the INFL coefficient, together with the COMP coefficient, suggest once again that Belgium falls under the "weak" credibility type.

c. The coefficients of the fiscal variables turned out to be statistically significant even if, as expected, lower relative to the estimates of previous sections, leading to the rejection of hypothesis (a). The fiscal position appears to affect long-term interest rate differentials, independently of its impact on inflationary expectations, and hence future exchange rate movements.
d. As in previous sections, the DEV term once again turns out to be statistically significant. Its coefficient indicates that, other things equal, a 10 percent devaluation of the Belgian franc central rate relative to the deutsche mark results in a 1.74 percentage point rise in the Belgian-German long-term interest rate differential over the next three quarters.

e. The coefficient of the REG term remains positive and statistically significant, suggesting that the announcement of the "franc fort" policy contributed to the narrowing of the Belgian-German interest rate differential. In particular, the announcement of the hard currency policy is estimated to have resulted in a reduction of this long-term rate differential by 0.5 percentage point relative to what it would otherwise have been.

f. Finally, the COMP*TIME coefficient turned out to be statistically significant and opposite in sign relative to the COMP coefficient, confirming that Belgium has been moving towards the "strong" version of credibility over the period under discussion.

In view of the above observations, and in particular given that the significance of the fiscal variables appears to extend beyond their impact on expected exchange rate movements, we proceed to adjust the interest rate corridors appropriate for the testing of exchange rate credibility. (The adjusted corridors are depicted in Chart 4.) In contrast to the results of Section II, long-term exchange rate credibility from 1990 onward can no longer be rejected. 1/ In other words, the fact that the Belgian bond yield has remained above the simple interest rate corridor of section II can be explained by credit risk, rather than exchange rate risk, considerations for the period since 1990.

The evidence of serial correlation in the error term of the above equation, which is also present in the estimation results of the previous sections, warrants some discussion. To the extent that it reflects the existence of a "peso problem", it could raise questions about the adequacy of our assumed formulation of inflationary expectations. On the other hand, serial correlation could be a reflection of a number of other factors, highly relevant to the issue of exchange rate credibility. First, it would appear implausible to suppose that a new exchange rate like the EMS in its early stages should be widely known and credible from the moment of its inception. In this respect, models of Bayesian learning about realignment probabilities like Driffill and Miller (1993) would predict serial correlation in the error term of a reduced-form equation like the one estimated above. Second, it would appear reasonable to postulate that learning about the policy preferences of the monetary authorities can be a non-trivial exercise, particularly as relevant econometric estimates derived

1/ It is interesting to note that the timing of the attainment of exchange rate credibility coincides almost exactly with the announcement of the "franc fort" policy.
CHART 4
BELGIUM

Adjusted Interest Rate Corridors
(Long Term Bond Yield)


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under a pre-EMS regime would be sensitive to the Lucas (1976) critique. Under these conditions, the authorities may have to resort to signalling in order to reveal crucial aspects of their objective function. Signalling models in the spirit of Vickers (1986), would again account for the serial correlation observed in the above equation.

VIII. Alternative Specifications

In this section, we shall examine the sensitivity of the above results to a number of changes in the specification of the estimated equations. In particular, we shall concentrate on assessing how the conclusion that there may exist a non-trivial credit risk component of interest rate differentials, in the face of which long-run exchange rate credibility cannot be rejected, fares when tested under two alternative specifications: one which includes additional explanatory variables, and one which makes use of a more dynamic version of the equation estimated in the previous sections. If should be emphasized that these tests do not claim to address in an exhaustive way the issue of robustness of the conclusions reached so far, but should merely be interpreted as attempting to provide some assurance that these conclusions are not excessively sensitive to the specification chosen.

The equations of the previous section use the overall Belgian-German debt differential in order to estimate the credit risk component of the long-term interest rate differential. This formulation implicitly assumes that every component of debt contributes equally to the interest rate differential, an assumption which appears reasonable since, provided that inflationary expectations have been adequately specified, the presence of the fiscal variables is meant to exclusively capture credit risk, and not exchange rate risk resulting from anticipated future inflation differentials.

Including the Belgian-German domestic currency-denominated debt ratio differential (DEBTDOM) and the foreign currency-denominated debt ratio differential (DEBTFOR) separately as explanatory variables in the regression equation could provide some indication about the validity of this last presumption. In particular, whereas it can be argued that domestic currency-denominated debt may create an incentive for the authorities to monetize the debt, thus reducing its real value, the same does not apply to foreign currency-denominated debt, as monetary financing and an ensuing currency depreciation could actually increase the debt burden in terms of domestic resources.
The estimation results, breaking up the DEBT variable into its domestic and foreign currency components, are as follows:

\[
RB = 0.265 \text{INFLPR} + 0.013 \text{DEBTDOM} + 0.046 \text{DEBTFOR} + 0.265 \text{DEFPR} - 0.051 \text{COMP} \\
(1.99) \quad (2.06) \quad (2.61) \quad (3.27) \quad (2.24) \\
+ 0.204 \text{DEV} + 0.304 \text{REG} + 0.0019 \text{COMP*TIME} \\
(2.70) \quad (2.17) \quad (1.87)
\]

\[R^2 = 0.95 \quad \overline{R^2} = 0.93 \quad F(10,26) = 50.4 \quad SE = 0.0032\]

\[\text{DW}(1) = 1.91 \quad \text{DW}(4) = 1.91 \quad \hat{\rho}_1 = +0.426(t=2.40) \quad \hat{\rho}_4 = -0.203(t=2.10)\]

The coefficients of the two components of the DEBT variable remain statistically significant and have the expected sign, while the estimated coefficients of the remaining explanatory variables are very close in magnitude to the results of the previous section. The statistical significance of the DEBTFOR coefficient lends support to the contention that the above specification correctly interprets the fiscal variables as reflecting a (non-trivial) sovereign credit risk, rather than the expectation of exchange rate changes. On the other hand, the point estimates of the two coefficients are appreciably different, even though the hypothesis that they are equal cannot be rejected at the 10 percent confidence level. This could be interpreted to indicate that the domestic and foreign-currency components of debt affect credit risk differently, even though it may also be partly due to multicollinearity between DEBTDOM and DEBTFOR, and to the imposition of linearity, which does not allow the sensitivity of credit risk (and interest rate differentials) to the debt to depend on the size of the debt.

If the estimated coefficients of DEBTDOM and DEBTFOR are weighted by the shares of these two types of debt in the total debt differential, we can calculate the sensitivity of RB to changes in the overall debt differential to be 0.0179, almost identical to the corresponding coefficient of the previous section. In fact, the new adjusted interest rate corridors that result from the estimated coefficients of the fiscal variables in the above equation are very close to those of Chart 4. Thus, this alternative specification does not affect the conclusions of the previous section regarding long-run exchange rate credibility for Belgium.

Similarly, the inclusion of a number of additional explanatory variables does not alter the results of the previous section. In particular, the difference in the unemployment rate and in the current account surplus-to-GDP ratio between Belgium and Germany were added, to capture expectations of the authorities' response to the state of the real economy and to external imbalances. The coefficients of these two variables
turned out not to be different from zero, while the coefficients of the remaining variables were not substantially affected. 1/

A further criticism that could be made regarding the simple estimation procedure of the previous sections is that it is essentially non-dynamic in nature. An alternative specification, common in a number of portfolio models, is to allow for some form of partial, rather than instantaneous, adjustment of the relevant asset holdings. 2/ In this sense, a reduced form equation of the type:

\[ RB^* = a_1 INFLPR + a_2 DEBT + a_3 DEFPR + a_4 COMP + a_5 DEV + a_6 REG + a_7 COMP*TIME \]

that was estimated in the previous sections should be interpreted as a long-run relation. Actual adjustment is assumed to be spread over time, with the adjustment in the yield differential during the first period being a fraction \( \lambda \) of the full adjustment to its (new) equilibrium value: 2/

\[ RB_t - RB_{t-1} = \lambda (RB^* - RB_{t-1}) ; 0 < \lambda < 1. \]

Combining these two equations and rearranging terms gives the final equation to be estimated:

\[ RB_t = \lambda a_1 INFLPR_t + \lambda a_2 DEBT_t + \lambda a_3 DEFPR_t + \lambda a_4 COMP_t + \lambda a_5 DEV_t + \lambda a_6 REG_t + \lambda a_7 (COMP*TIME)_t + (1-\lambda)RB_{t-1} \]

A number of justifications can be offered for the imposition of partial adjustment in relative asset holdings. Perhaps the most straightforward is based on the assumption of transaction costs associated with portfolio adjustments. An empirical problem regarding this approach is that very often the estimated speed of adjustment is too slow to be plausible. An alternative approach would be to assume adaptive expectations regarding the explanatory variables. A difficulty with this approach is that an expectations formation rule for the debt differential based on a weighted average of its own lagged values will in general be inferior to a rule that takes into account the current stance of fiscal policy summarized by the primary budget deficit, as specified in the equations of the previous

1/ This result can be contrasted to Caramazza's (1993) conclusions for the case of France, which suggest that the authorities' exchange rate policy is perceived by market participants to be influenced by the level of the unemployment rate and, to a lesser extent, by the change in foreign exchange reserves.

2/ See, for example, Goldfeld's (1976) analysis of the demand for money in the U.S..
section. Finally, and perhaps more relevant for our case, the above reduced form equation may be justified on credibility grounds. The previous sections have provided evidence that exchange rate credibility in the case of Belgium is of a "weak" type, i.e. it depends crucially on market perceptions that the authorities are pursuing a set of policies ensuring long-run nominal convergence vis-à-vis Germany. A more general formulation would view the markets as assigning a probability $\lambda$ to the government pursuing such a set of policies and a probability $(1-\lambda)$ to the government deviating from these policies at some point in the future, and adjusting their portfolios accordingly. It can be shown that under these conditions, a relationship like the above equation would accurately describe the time-series properties of the yield differential.

For our present purposes, we shall not attempt to empirically distinguish between these justifications. Instead, we proceed to estimate the above equation, bearing in mind that it could be derived from any one (or any combination) of these considerations. The estimation results are as follows:

$$
RB = 0.159 \text{ INFLPR} + 0.013 \text{ DEBT} + 0.191 \text{ DEFPR} - 0.029 \text{ COMP} + 0.093 \text{ DEV} \\
(2.12) \quad (3.01) \quad (2.96) \quad (2.23) \quad (1.98) \\
+ 0.203 \text{ REG} + 0.0013 \text{ COMP*TIME} + 0.360 \text{ RB(-1)} \\
(2.35) \quad (1.88) \quad (2.95)
$$

$R^2 = 0.95$  $R^2 = 0.94$  $F (8,32) = 69.1$  $SE = 0.0034$

The coefficient of the lagged dependent variable turns out to be statistically significant, and its magnitude indicates that only 63 percent of the adjustment takes place in the first period. The coefficients of the remaining explanatory variables also turn out to be statistically significant and have the expected sign even though, as expected, their size is smaller in absolute value compared to the estimation results of the previous section.

In order to test for long-run exchange rate credibility, we need to calculate the long-run coefficients of the fiscal variables. As the derivation of the above reduced form equation makes clear, the long-run coefficient of each variable is equal to its short-run coefficient divided by one minus the coefficient of the lagged dependent variable. Accordingly, the long-run coefficient of DEBT and DEFPR can be calculated as 0.020 and 0.298 respectively, which turn out to be very close to the corresponding estimated coefficients of the previous section. 1/

1/ The long-run coefficients of INFLPR, COMP, DEV, REG and COMP*TIME, calculated as 0.248, -0.045, 0.145, 0.317 and 0.020 respectively, also turn out to be reasonably close to the estimation results of the previous section.
Thus, the adjusted interest rate corridors based on these long-run coefficients are almost identical to those of Chart 4. Therefore, even if one regards the above dynamic version as a superior specification relative to the static equation of the previous section, the main result that long-run exchange rate credibility cannot be rejected in the case of Belgium remains unaffected.

Allowing for a less restrictive dynamic specification does not alter this result. As an example, we considered a formulation according to which the current period adjustment in RB depends, in addition to the difference between \( RB^* \) and \( RB_{t-1} \), on a term \( (RB_{t-1}-RB_{t-2}) \), as follows:

\[
RB_t - RB_{t-1} = \lambda (RB^*-RB_{t-1}) + \kappa (RB_{t-1}-RB_{t-2}) .
\]

The second term in the above equation could be interpreted as capturing the cost of past portfolio adjustments. Accordingly, the equation to be estimated becomes:

\[
RB_t = \lambda a_1 \text{INFLPR}_t + \lambda a_2 \text{DEBT}_t + \lambda a_3 \text{DEFPR}_t + \lambda a_4 \text{COMP}_t + \lambda a_5 \text{DEV}_t + \lambda a_6 \text{REG}_t + \lambda a_7 (\text{COMP*TIME})_t + (1-\lambda+\kappa)RB_{t-1} + \kappa RB_{t-1} .
\]

It is evident from the specification of the above equation that all structural parameters can be identified. The estimation results are as follows:

\[
\begin{align*}
RB &= 0.148 \text{INFLPR} + 0.013 \text{DEBT} + 0.203 \text{DEFPR} - 0.026 \text{COMP} + 0.092 \text{DEV} \\
&\quad + 0.205 \text{REG} + 0.0013 \text{COMP*TIME} + 0.641 RB(-1) - 0.274 RB(-2) \\
R^2 &= 0.95 \quad \bar{R}^2 = 0.94 \quad F(9,31) = 66.7 \quad SE = 0.0032
\end{align*}
\]

The point estimates of \( \lambda \) and \( \kappa \) are 0.633 and 0.274, respectively. Accordingly, the estimated long-run coefficients of the DEBT and DEFPR terms are, respectively, 0.0021 and 0.321, almost identical to the estimation results of the previous section. Hence, the conclusions of the previous section regarding exchange rate credibility are not affected by this specification.

IX. **Alternative Tests for Exchange Rate Credibility and Credit Risk**

Given the crucial importance of credit risk for the reversal of the conclusions of simple interest rate corridor analysis regarding long-term

---

1/ The estimated long-run coefficients of the INFLPR, COMP, DEV, REG and COMP*TIME terms are, respectively, 0.234, -0.0041, 0.145, 0.324 and 0.0021, also reasonably close to the estimation results of the previous section.

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exchange rate credibility, comparison of our results of Section VII against alternative indicators of credit risk, based on different data sets, would appear warranted. In principle, two types of methodologies could be explored: one which attempts to estimate pure exchange rate risk, net of credit risk, directly, and one which concentrates on the estimation of credit risk.

With regard to the former type of methodology, perhaps the most natural option would be to generate estimates of exchange rate risk based on Eurocurrency rate differentials. This approach has been utilized by, among others, Artis and Taylor (1989), Caramazza (1993) and Giovannini (1990) in addressing the issue of exchange rate credibility over shorter time horizons relative to the present study. In addition to being in principle unaffected by sovereign credit risk, the use of Eurocurrency rate differentials can also be expected to correct for the impact of capital flow imperfections, due to capital controls especially during the first half of the 1980s and to the dual exchange rate system that was in effect until 1990. These imperfections could raise doubts about the validity of the interest rate parity condition on which the interest rate corridor approach is based. However, as the maturity of Eurocurrency assets does not typically exceed the 12-month horizon, Eurocurrency rate differentials cannot in practice be used to test for long-run exchange rate credibility, as defined in this paper.

With regard to alternative indicators of credit risk, a natural approach would be to examine Belgian-German interest rate differentials on government securities denominated in the same currency. Among such markets, the U.S. dollar secondary bond market is the most active, and Belgian government bonds have participated in it during the greatest part of the period under discussion. On the other hand, the market for non-deutsche mark German bonds is almost non-existent, and hence a formal test of credit risk based on Belgian-German interest rate differentials in such a market is not feasible. Accordingly, we chose to estimate credit risk on the basis of the interest rate differential between U.S. dollar Belgian bonds and another U.S. dollar-denominated good-quality paper, namely World Bank bonds, on the assumption that the latter has similar credit risk and liquidity characteristics relative to German bonds.

It should be pointed out that, even if our assumption regarding the credit risk and liquidity characteristics of World Bank bonds is reasonably valid, the above interest rate differential can be expected to be only an imperfect indicator of the credit risk relevant for the purposes of this paper, for a number of reasons. First, given that the average holding period in the secondary market is significantly shorter relative to the primary market, investors may require a smaller risk premium in the former relative to the latter market. Second, different types of debt may carry different credit risk, as already suggested by the empirical results of Section VIII. A relevant element in this regard may be the fact that the share of non-domestic investors in the total holdings of U.S. dollar-denominated Belgian government debt is significantly larger than their share
in the primary Belgian franc-denominated market. 1/ To the extent that
the expectation of an increase in withholding taxes constitutes an important
aspect of credit risk, it may be reasonably postulated that the probable
magnitude of such a tax increase with regard to non-resident holders may be
substantially smaller relative to that on domestic investors, in the absence
of EC-wide withholding tax harmonization, as the former group can be
expected to be more sensitive to international tax differences relative to
the latter. This consideration may explain why no withholding tax is
currently imposed on non-residents, as opposed to residents. Both of the
above factors would suggest that the interest rate differential under
discussion may underestimate the magnitude of credit risk in the Belgian
franc-denominated primary market. Finally, from a practical point of view,
data on the relevant securities of the desired maturity are not available
for part of the period under consideration, so that there exist significant
gaps in our data set.

As an alternative indicator of credit risk, we looked at the interest
rate differential between deutsche mark-denominated Belgian government bonds
on the secondary market and primary-market German government bonds of the
same currency denomination. While this indicator is not sensitive to the
somewhat arbitrary assumption about credit risk and liquidity that we had to
make with regard to World Bank bonds, it nonetheless suffers from some
additional shortcomings. On the one hand, primary market rates can be
expected to be influenced by general liquidity conditions to a much lesser
degree relative to secondary market rates; hence, the interest rate
differential under discussion could exhibit significant fluctuations which
do not entirely reflect changes in credit risk. In addition, the Deutsche
mark market for Belgian bonds is thinner, and therefore less liquid,
relative to the U.S. dollar market; thus, the interest rate differential
under discussion may overestimate credit risk. Finally, significant data
gaps exist for this indicator as well.

Given the limitations, and possible biases, described above, we would
not expect these indicators to exactly coincide with the credit risk
estimates of Section VII. At best, the U.S. dollar interest rate
differential could provide a lower bound, and the Deutsche mark interest rate
differential (corrected for extreme fluctuations) an upper bound for
the credit risk relevant for our purposes. Accordingly, we shall
investigate whether the two indicators are reasonably close to our credit
risk estimates on which the interest rate corridor adjustment was based. To
this end, we run a constrained version of the regression of Section VII,
including as explanatory variable the estimated credit risk (CRED),
generated from the point estimates of the DEBT and DEFPR coefficients. The
estimation results are as follows:

1/ The latter share remains very limited, despite the liquidity
improvements resulting from the bond market reforms since 1990. On this
issue see, for example, Vanhorebeek and Moesen (1993).
\[ RB = 0.288 \text{ INFLPR} + 1.002 \text{ CRED} - 0.052 \text{ COMP} + 0.193 \text{ DEV} + 0.270 \text{ REG} \]
\[ (3.85) \quad (5.62) \quad (2.10) \quad (2.55) \quad (2.30) \]
\[ + 0.0023 \text{ COMP} \times \text{TIME} \]
\[ (2.00) \]
\[ R^2 = 0.95 \quad R^2 = 0.94 \quad F(6,22) = 66.6 \quad SE = 0.0031 \]
\[ DW(1) = 1.96 \quad DW(4) = 1.90 \quad \hat{\rho}_1 = +0.363(t=2.15) \quad \hat{\rho}_4 = -0.206(t=1.96) \]

On the basis of the t-statistic of the CRED coefficient, we can construct the 95 percent confidence interval for this coefficient, and hence for the estimated credit risk. This latter confidence interval is depicted in Chart 5, along with the two alternative credit risk indicators, for the period 1988-1992.

The indicators based on interest rate differentials in the U.S. dollar- and Deutsche mark-denominated bond markets point to the existence of credit risk on Belgian government paper. 1/ Concerning the magnitude of this credit risk, both indicators generally fall within the 95 percent confidence interval derived from the above regression equation. On the other hand, the interest rate differential on the U.S. dollar-denominated market consistently falls somewhat short of our point estimate of credit risk. While this may reflect the sources of downward bias referred to above, it may also point to a non-trivial "peso problem" in our estimate of inflationary expectations. In any event, even if the lower bound of the confidence interval is used as the relevant measure of credit risk in adjusting the interest rate corridor, the main conclusions of Section VII would not be significantly affected, the only difference being that non-rejection of the exchange rate credibility hypothesis would now be attained one quarter later.

X. Summary and Policy Implications

The purpose of this paper was to test the credibility of Belgium's exchange rate policy, particularly in view of the fact that simple interest rate corridor analysis indicates that long-term credibility has yet to be achieved, despite substantial progress in this area.

To this end, we proceeded to inquire in some detail about the determinants of long-term interest rate differentials. The main conclusion was that fiscal variables appear to affect the interest rate differentials

1/ An additional indication of credit risk is the existence of a long-term bond yield differential between Belgium and Luxembourg, which have been in a credible monetary union since 1922, in excess of the difference in withholding taxes between the two countries; see Commission of the European Communities (1993).
CHART 5
BELGIUM
Estimates of Credit Risk

Belgian Differentials vs.

- World Bank
- Germany
- Confidence Interval

Sources: Staff Calculations and Financial Times.

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quite independently from their impact on inflationary expectations, and hence on anticipated exchange rate movements, thus raising serious questions about the usual assumption of interest rate parity, at least insofar as expected exchange rate movements exclusively reflect expected inflation differentials. We then proceeded to adjust the interest rate corridors accordingly, and concluded that long-term exchange rate credibility can no longer be rejected.

It should be admitted that the specific formulation of inflationary expectations we have chosen is somewhat arbitrary, despite its appealing features. A particular shortcoming is that it does not take into account the impact of announced future policies. A more fundamental question is whether the fiscal variables may affect expected exchange rate changes via channels other than inflationary expectations.

The importance of fiscal variables in affecting long-term interest rate differentials can be quantified in a rather straightforward way: given the current levels of the Belgian fiscal variables, and assuming (weak) exchange rate credibility, our estimation results suggest that the primary surplus must rise to around 8 percent of GDP for Belgium to attain long-term interest rate equalization relative to Germany. It should be pointed out that this estimate is on the conservative side, as weak credibility presupposes that Belgium's inflation will remain below Germany's over the near future.

Even though the breakdown of the impact of the fiscal variables into an effect that works through expected exchange rate movements and an effect related to credit risk may not be of practical significance for the trends in overall interest rate differentials per se, we believe it to be sufficiently important to be worth pursuing. In addition to its relevance for the problem of optimal debt financing, it also indicates that long-term interest rate differentials may persist, even if the ERM becomes more credible over time, or indeed after the introduction of a single European currency.

Thus, the analysis highlights the importance of fiscal consolidation as a top policy priority, as the current fiscal imbalances are contributing to the persistence of the long-term interest rate differential vis-à-vis Germany. Our findings suggest that this effect works via two main channels: (a) via the impact of the fiscal variables on inflationary expectations, reflecting the perceived incentive of the authorities to monetize the large public debt, and (b) via a credit risk component.

This paper had been largely completed before the decision to widen the EMS fluctuation band from 2.25 to 15 percent was reached in August 1993. While the new fluctuation band, if fully exploited, may arguably be regarded as effectively equivalent to floating for most EC currencies, we feel that the analysis of exchange rate credibility largely retains its relevance. In the first place, the widening of the band was conceived as a temporary measure in response to the currency turmoil, with the aim of re-establishing
the narrow band in the near future. Secondly, and perhaps more important, it is not very likely that a small, open economy like Belgium would opt for pure floating, even during the transition period of the wider fluctuation band. In fact, the Belgian monetary authorities' policy response to the widening of the band was to raise short-term interest rates, while indicating that they will pursue a policy of unilaterally pegging the Belgian franc close to its old fluctuation band vis-à-vis the deutsche mark. Under these conditions, while the results of the analysis of exchange rate credibility may be sensitive to some extent to the institutional framework in place, particularly with regard to intervention by other EMS central banks which is currently mandatory only when a currency reaches the boundary of its 15 percent fluctuation band, they can still shed some light on the feasibility of unilaterally pegging the exchange rate without reintroducing capital controls.
References


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