European Financial Markets Integration and the Risk Premium on Italian Government Debt *

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Introduction

The Maastricht Treaty sets precise limits to the budget deficit and to the stock of government debt of the countries wishing to join the monetary union. Fiscal adjustment thus becomes a requirement for the common currency. The countries that lack fiscal discipline are those penalized by high interest rates on their government bonds, relative to those prevailing in Germany. If the interest rate differential of these countries is mostly explained by foreign exchange risk, then the Treaty, paradoxically, would make their fiscal adjustment harder to achieve. As Paul De Grauwe argues in his paper (pp. 33-45 of this issue), it would be much better to allow them into the Monetary Union first, thereby reducing their long-term interest rate and, in this way, the burden of the adjustment. However, countries with high government debts and deficits may pay a substantial default risk premium on their debt, because their policies lack credibility. In such a case, a monetary union would encourage investors from the virtuous countries to purchase these bonds, looking for better returns. Government debt issued by high yield countries could then become a source of systemic risk for the Monetary Union. It is therefore of great importance to disentangle the exchange risk component from the default risk component in the interest rate spreads of European countries. This is precisely the purpose of this paper, applied to the differential between the Italian and the German long-term government bond yields.

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An econometric accounting of interest rate differentials

The long-run interest rate on Italian government bonds has fluctuated widely in the last four years. In Figure 1 we show the daily 10-year yield on the benchmark issue of the Italian BTP (*Buoni del Tesoro Poliennali*) from the beginning of January 1992 until the end of November 1995: the yield ranges from a minimum of 8.53% on February 2, 1994 to a maximum of 15.29% at the peak of the exchange rate crisis on October 7, 1992, when the lira was forced to abandon the European Monetary System. During this period the long-term interest rate differential with the analogous 10-year benchmark German government bond (the Bund) has oscillated between 248 and 792 basis points. What inference can we make by observing the spread of the BTP over the Bund? If the spread is a good indicator of the international capital market assessment of the riskiness of the debt issued by the Italian government, then we could hope to decompose the spread into two different components: the first would reflect the lira exchange rate risk, while the second would reflect the default premium charged by the market. The spread decomposition could then be taken as a rough measure of the soundness and credibility of the policies adopted to adjust fiscal imbalances.

This approach assumes that the spread movements mostly depends on purely Italian risk factors, that is on domestic economic policies. However, just by looking at the correlation matrix among the various European government bond yield spreads with respect to the German Bund one can see how tightly correlated the movements of the various spreads are (Table 1): the mean value of all the pair wise correlations is around 0.75. In addition, one can notice that the level of the long-term interest rate in Germany is itself positively correlated with the yield differentials. The correlation analysis supports the practitioner's view that when interest rates are declining in the core market, Germany, rates come down faster in the so-called high yielders. One could rightly argue that, in addition to purely domestic factors, spread movements in the European bond markets depend on a common risk factor, which would depend on portfolio strategies of global investors: during periods of rising interest rates they all tend to shift money towards the core market – a sort of flight to safety – thus widening the yield spreads with the other markets.

FIGURE 1

10-YEAR ITALIAN GOVERNMENT BOND YIELD (BIT 10) AND DIFFERENTIAL WITH 10-YEAR GERMAN GOVERNMENT BOND (SBITDE 10)

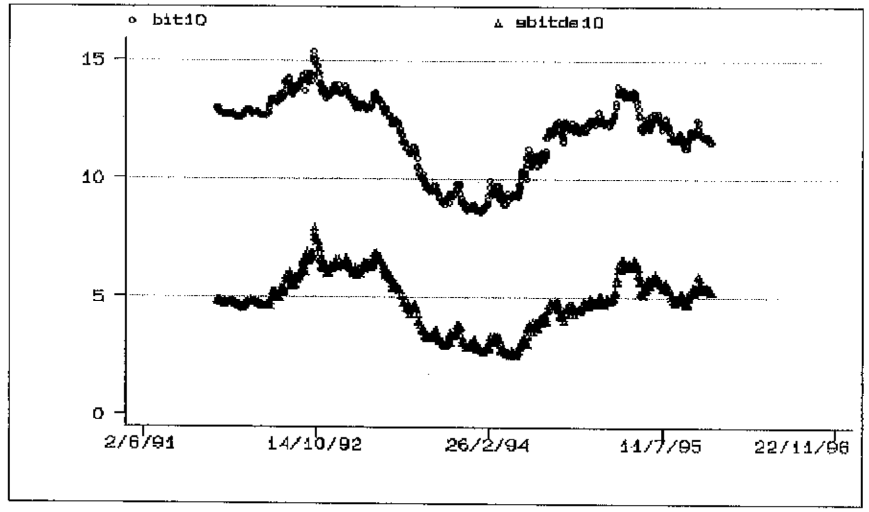


TABLE 1

CORRELATION MATRIX OF INTEREST RATE DIFFERENTIALS

	GE	IT-GE	FR-GE	SP-GE	DK-GE	SW-GE
GE	1.000					
IT-GE	0.456	1.000				
FR-GE	0.627	0.797	1.000			
SP-GE	0.237	0.899	0.745	1.000		
DK-GE	0.338	0.718	0.811	0.848	1.000	
SW-GE	0.172	0.514	0.561	0.714	0.864	1.000

GE = 10-year German government bond yield.
Co-GE = country Co 10-year yield differential with German government bond.
Co = Italy (IT), France (FR), Spain (SP), Denmark (DK), Sweden (SW).

The opposite occurs during periods of bull market. These portfolio movements, given nowadays international capital market integration, could cause the rate differential co-movements documented by the correlation matrix.

The task of disentangling the purely domestic risk factors, the exchange rate risk and the default risk, from the European-wide common factor is not trivial. We have designed a few statistical tests which can only produce preliminary evidence. The tests, however, suggest that the common factor can account for the vast majority of the variability of the Italian government bond spread over the Bund, after taking into account exchange rate risk. The size of the unexplained portion of the interest rate differential, commonly attributed to some sort of default risk, is surprisingly small, even during periods of extreme financial market volatility.

The first approach that we adopt, indicated as model 1, is to regress the daily yield differential between the BTP benchmark issue and the Bund over the contemporaneous interest rate levels of the government benchmark bonds of France, Spain, Denmark, Sweden and Germany. If purely domestic factors were the main determinant of the Italian spread, this should be orthogonal with respect to purely foreign factors, such as the yield levels in other European markets. If, however, common European portfolio flows account for the variability of Italian spread, and if portfolio flows are driven by the trend in European rates, foreign bond yield should explain a good portion of what happens to the relative cost of Italian government debt.

Different yield levels in different countries depend on exchange rate expectations too, as the assets are denominated in different currencies. To eliminate the role of exchange rate we assume that a hypothetical investor in Italian and German bonds would hedge foreign exchange risk optimally throughout the life of the bond. To do so, the investor could use interest rate swaps with the same maturity of the bonds: it is well known that a long-term interest rate swap is equivalent to a sequence of forward foreign currency contracts. It is also known that the minimum variance optimal hedge ratio can be found by regressing the return of the financial asset being hedged on the return of the hedging instruments. Thus we regressed the 10-year BTP-Bund spread over the 10-year swap rate for Italy, Germany, France, Spain and Sweden.

First, the regression was run using the swap rate for the lira and the Deutsche Mark separately because of the different conventions used in the swap and government bond markets (swaps are quoted at par, whereas bonds are quoted at discount to par; government bond yields are typically compounded rates while simple rates are used for swaps) and the different tax treatments (foreign holdings of Italian bonds, unlike swaps, were subject to different withholding tax regimes during the sample period) would make the calculations to adjust for these factors very difficult: the estimated regression coefficient, instead, would automatically adjust for all these factors. We added the swap rate for other countries to allow for cross hedging, which could help to improve foreign exchange risk management. Finally, the swap rate for Denmark was not included because we lacked the data before January 1993; needless to say, the results were unaffected when we re-run the test with the Danish data for the shorter sample period for which these data were available.

The regression specification and the results are shown in Table 2. Only the R^2 is reported because the interpretation of the individual coefficient estimates would be vitiated by the high collinearity of the data. In addition, no economic meaning can be attributed to each specific interest rate contribution to the BTP-Bund yield spread. The table shows that 97% of the daily variability of the spread can be accounted by the level of long-term European interest rates, proxy variables for what we have called the common risk factor, after hedging properly for exchange rate risk. The residuals from this regression are the daily fractions of the spread which can be attributed neither to exchange risk nor to the European rates comovements. They are related to, even though they cannot be identified with, the default risk premium that the market charges on the Italian government debt. Figure 2 shows how the variance of the un-

TABLE 2

REGRESSIONS SPECIFICATION AND ESTIMATION
(2/1/1992 - 29/11/1995)

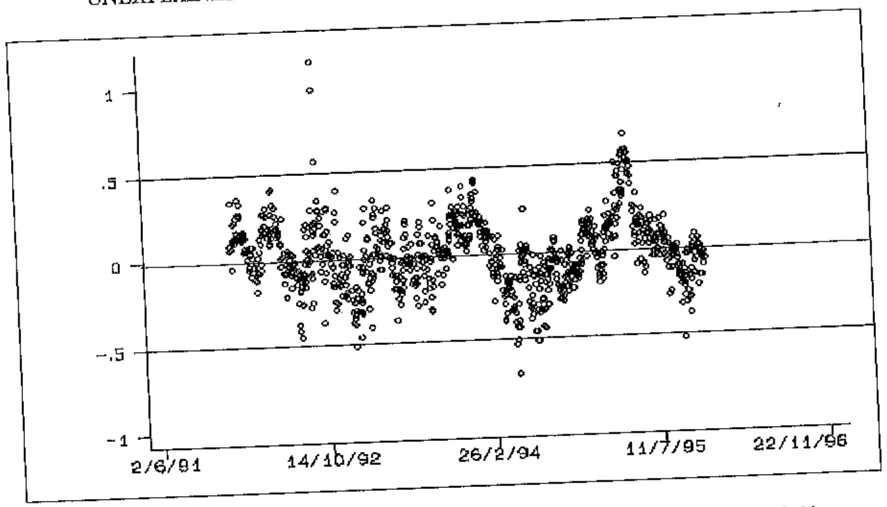
Model 1	
$(BY10IT - BY10GE)_t = a + b_{Co} \Sigma_{Co} BY10Co_t + d_{Cn} \Sigma_{Cn} SR10Cn_t + u_t$	$R^2 = .97$
Model 2	
$(BY5IT - BY5GE)_t = a + b_{Co} \Sigma_{Co} BY5Co_t + d_{Cn} \Sigma_{Cn} SR5Cn_t + u_t$	$R^2 = .98$
Model 3	
$(BY10IT - BY10GE)_t = a + b\, FPC_t + V_t$	$R^2 = .85$
$V_t = a + b_{Co} \Sigma_{Co} BY10Co_t + d_{Cn} \Sigma_{Cn} SR10Cn_t + g\, SR10IT_t + u_t$	$R^2 = .94$
Model 4	
$(BY10IT - SR10IT)_t = a + b_{Co} \Sigma_{Co} BY10Co_t + d_{Cn} \Sigma_{Cn} SR10Cn_t + u_t$	$R^2 = .80$

BY10Co = country Co 10-year government bond yield.
Co = Germany, France, Spain, Denmark, Sweden.
SR10Cn = country Cn 10-year swap rate.
Cn = Germany, France, Spain, Sweden.
FPC = first principal component

explained part of the spread is quite small, as there are only a few excursions above 50 basis points. Only in two instances, the lira departure from the European Monetary System and the March 1995 general exchange rate market turbulence following the Mexican debt crisis, did the spread go beyond half percentage point, albeit for a few days. Unlike government bonds, the 10-year swap market is rather illiquid. Thus, we tested the same model (model 2) using 5-year government bond yields and swaps. As Figure 3 and Table 2 indicate, the results are practically identical to those obtained with 10-year securities.

FIGURE 2

UNEXPLAINED 10-YEAR INTEREST RATE DIFFERENTIAL: MODEL 1



To capture the common risk factor we resorted to a different approach which relies on the statistical decomposition of the variance-covariance matrix of the bond yield differentials. Any variance-covariance matrix can be reduced to the variance covariance matrix of linear combinations of orthogonal components, which are known as principal components. It is then possible to calculate which fraction of a generalized measure of the total variance can be attributed to each component. A common practice in bond analysis is to interpret the components as separate common risk factors driving asset returns.[1] A rough but useful financial economics interpretation

[1] For example Litterman and Scheinkman (1991).

of each principal component is that of the portfolio with the maximum correlation with the risk factor represented by that component.

FIGURE 3

UNEXPLAINED 5-YEAR INTEREST RATE DIFFERENTIAL: MODEL 2

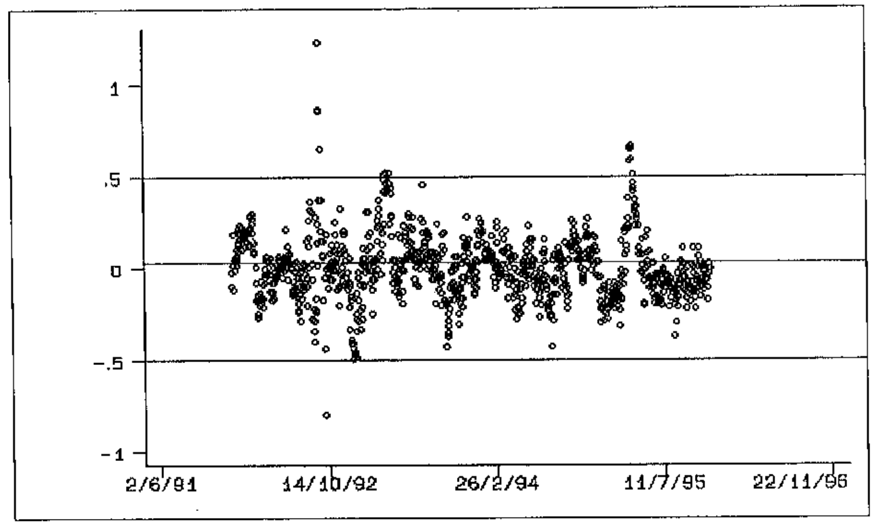
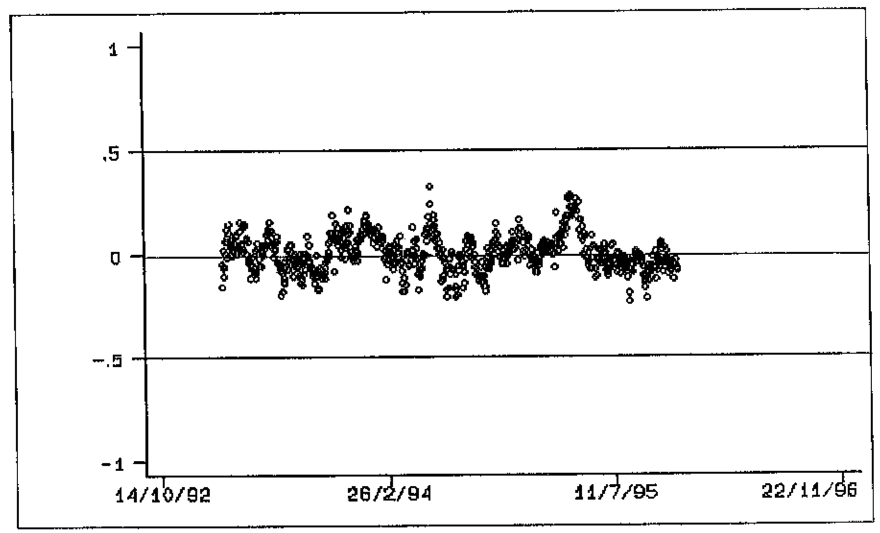


FIGURE 4

UNEXPLAINED 10-YEAR INTEREST RATE DIFFERENTIAL: MODEL 3



We took the variance-covariance matrix of five 10-year government bond yield differentials with Germany (Italy, Sweden, France, Spain and Denmark) and calculated its principal components. As it is typically found for asset returns, few components explain the bulk of return variability: in our case the first component accounted for 80% of spread volatilities, the second for 16%, while already the third was negligible (Table 3). We interpreted the first principal component as the common European bond risk factor because a hypothetical portfolio that behaved over time as this component would provide the maximum risk exposure to the common movements in European yield spreads. This risk factor had a similar impact on all five yield spreads being considered during the sample period, perhaps somewhat attenuated in the case of France. The impact of the second and third components varied widely instead in both size and sign for the various countries, supporting the view that there is only one pervasive factor in European bond markets (Table 3).

TABLE 3

PRINCIPAL COMPONENT DECOMPOSITION OF INTEREST RATE DIFFERENTIALS

Principal component	Proportion explained		Cumulative
1	0.8040		0.8040
2	0.1600		0.9640
3	0.0196		0.9836
Eigenvectors:	First	Second	Third
IT-GE	0.63903	–0.57017	0.36176
FR-GE	0.15458	–0.04990	0.44137
SP-GE	0.53615	–0.07902	–0.78585
SW-GE	0.46090	–0.79518	0.17048
DK-GE	0.26050	–0.18401	0.16644

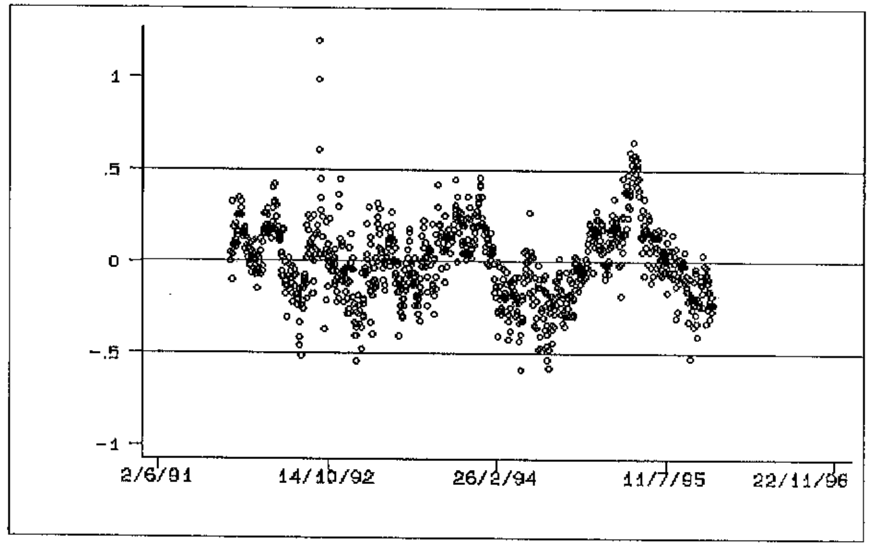
Co-GE = country Co 10-year yield differential with German government bond.
Co = Italy (IT), France (FR), Spain (SP), Denmark (DK), Sweden (SW).

This common factor accounted for 85% of the BTP-Bund spread variability when the latter was regressed on the former (model 3). The residuals from this regression, in turn, could be themselves regressed on the swap rates to eliminate the foreign exchange risk. We chose to add among the regressors the foreign government bond yield levels

to capture the part of the common European risk factor that was not accounted for by the first principal component: 95% of the dependent variable variability was explained by the regressors. The residuals, which are shown in Figure 4, are thus a second estimate of the unexplained part of the Italian long term yield spread over the German rate, after accounting for exchange rate risk and the co-movement of European rates. Their variance is always very small, within a band of 40 basis points.

FIGURE 5

UNEXPLAINED 10-YEAR INTEREST RATE DIFFERENTIAL: MODEL 4



We tried a third way to measure the unexplained part of the Italian spread which could be attributed residually to default risk. We started from the differential between the 10-year BTP yield and the 10-year lira swap rate: because the only difference between the two securities is just the issuer – the Italian government versus a private financial institution – this spread has been taken to measure the premium against the risk of default required by investors.[2]

If this spread is truly a default premium driven by domestic factors only, it should be orthogonal to foreign variables to the extent that the assessment of default depends on domestic policies. We thus

[2] Favero, Giavazzi and Spaventa (1996) is a recent example.

regressed the 10-year BTP-swap rate differential on the bond yields and swap rates of the five European countries considered, other than Italy (model 4). The results mirror what we had found with the previous approaches: 80% of this spread variability is accounted by the foreign long-term interest rates, and the regression residuals (Figure 5), which estimate the unexplained part of the spread, exceed the 50 basis points level only during a few days in the Fall of 1992 and March 1995.

Conclusions

On the whole, three different statistical approaches bring us to the same conclusions. Changes in the long-run interest rate differentials with Germany do not seem to be associated with a different perception of the default risk of the Italian government debt because its variability is mostly accounted for by changes in foreign exchange risk and by a pervasive European bond risk factor. We interpret this latter factor as originating from the globalization of investor portfolios. The unexplained part of the Italian interest rate differential over Germany shows a variance with excursions of no more than 50 basis points. Only for a few days, under extreme market conditions, this part of the spread exceeds this size. Thus, interest rate differentials seem rather ill suited to assess financial market appraisal of domestic economic policies, as it is often done in the press.

Two caveats are needed. First, we have been able to decompose statistically the variability of the Italian interest rate differential; but we still cannot say anything on the reasons behind the average rate differential with Germany. One thing is the spread variability, another is its average level. If we are concerned about risk premia, however, we should focus on variability since we know that premia are proportional to variability under a broad class of financial models. Presumably, the average rate differential is almost entirely due to the expected exchange rate depreciation, even though there is nothing in the statistical test presented that could support this view.

Second, we have implicitly assumed that the purely domestic default risk is unrelated to the level of foreign interest rates. This may

not be true, because a higher level of interest rates in Germany could signal higher rates in Italy, thus making the task of adjusting Italian fiscal imbalances harder. Foreign rates and default risk could thus be correlated and the possibility of identifying a common European factor would then disappear since no instrumental variables can be easily found to break the identification problem. Having said so, we think we have documented how misleading it would be to analyze individual European rate differentials in isolation, without taking into account the common nature of their variabilities.

REFERENCES

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