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# Financial markets' assessments of EMU* A comment

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The paper by David Bates has two main objectives: a discussion of the assumption and methodologies of "EMU probability calculators" and a discussion of what can be inferred from financial data, available at the beginning of 1999, regarding future policies of the European Central Bank. I shall organize my discussion around these two points.

## 1 The methodology of EMU probability calculators

In this section of the paper two types of calculators are discussed: nonstandard calculators and term-structure-based calculators. Nonstandard calculators include Arrow-Debreu contracts and option-based EMU assessments. Arrow-Debreu contracts are securities that pay off contingent upon the countries being admitted; two such contracts, for Italy and Spain, began trading on the Iowa Electronic Markets at the beginning of March 1998. This was clearly too late; in fact, at that date the uncertainty on the list of member countries, officially announced on the second of May, was already very limited and all fluctuations in prices seem to be related to liquidity rather than to shifts in underlying fundamentals. Option-based EMU assessments exploits the information from volatilities of future intra-European cross-exchange rates implicit in currency options. The problem here is data availability; in fact the author himself states that, in the course of 1998, no actively traded options maturing after the first of January 1999 were available.

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Term-structure calculators exploit the expectational model of the term structure to derive implicit forward rates, which are then mapped into probabilities by assuming that a candidate country's forward rate for a date T is a weighted average of two forward rates: the European one (empirically the German forward rate) and the one for that country in the case it is left out of EMU, the weights being the probabilities that a country at date T belongs to EMU, or is out of EMU, respectively. Given that the spread on European forward rates goes to zero when a country joins EMU, a measure of the probability that a country belongs to EMU at date T can be associated to each estimate of the spread in the non-EMU scenario.

All term-structure-based calculators reviewed by Bates can be identified by different specific assumptions in the general framework discussed above. Term-structure-based calculators are analyzed by considering first the potential sources of bias affecting the general framework and then the validity of specific calculators. Such potential sources of bias are, in turn, the rejection of the expectational hypothesis, the divergence between inferred and conditional probabilities, the use of forward rates versus bond prices, and currency issues. The author argues convincingly for a small practical relevance of all these potential problems. Lastly, the issue of the specific assumptions for the non-EMU scenario is considered. The main conclusion of the analysis is that, despite large differences across methodologies in the evaluation of the non-EMU scenario, there is substantial agreement among all different term-strucuture calculators (see J.P. Morgan, 1997, Lund, 1997, and Favero *et al.*, 1997) in the identification of the dynamic of probabilities over time, and in attributing the bulk of convergence in 1998 to convergence of economic fundamentals.

I very much agree on this point, and I would like to reiterate by comparing directly the methodology of the EMU calculators by Favero *et al.* (1997) and by J.P. Morgan (1997) for the case of Italy.

The Favero et al.(1997) calculator is based on the following steps:

1. Estimate an extended Taylor-rule for short-term interest rate over the sample 1987:1-1996:2, where the sample is chosen to calibrate the behavior of the Italian Central bank in a period of low probability of convergence of Italy to EMU.

$$\begin{aligned} i_t = {} & (0.009)0.031 + (0.09)0.58 i_{t-1} + (0.10)0.23\,(p_t - p_t^*) + (0.08)0.23\,(y_t - y_t^*) + \\ & (0.02)-0.066 e_t + (0.02)0.045 e_{t-1}(0.211)+1.00 i_t^* - (0.251)0.717 i_{t-1}^* + \\ & (0.07)-0.19 DUMMY1_t + (0.006)0.031 DUMMY2_t \end{aligned} \tag{1}$$

where

$i_t^*$ :interest rate on 3-month EuroDM

$i_t$ :interest rate on 3-month Eurolira

$p_t - p_t^*$: difference between annual inflation in Italy and Germany

$y_t - y_t^*$: difference between annual GDP growth in Italy and Germany

$e_t$ : log of the USdollar/Deutschemark exchange rate

$DUMMY1$ :dummy for German reunification interacted with $(y_t - y_t^*)$

$DUMMY2$ : dummy for EMS crisis

2. Use this rule to estimate the level of Italian rates in the OUT scenario, projecting it forward for two years. The authors use "Consensus" forecasts for Italian and German inflation and growth, and for the dollar-Deutschemark exchange rate.

3. Fit an extended Nelson-Siegel forward function (see Söderlind-Svensson, 1997) through ten points: the current overnight rate, the eight rates obtained projecting the rule as described above, and an asymptote which corresponds to the long-run solution of the estimated rule.

4. Given the sequence of the instantaneous forward rates in the OUT scenario, derive the path of German rates from the estimated German instantaneous forward curve and form the instantaneous forward spread, from which probabilities are inferred.

The J.P. Morgan (1997) EMU calculator is based on the consideration that "if EMU were not around, the spread between Italian and German bonds would be highly correlated with international measures of risks such as US-Australia, US-Canada, Brady-Treasury, the US long-bond 2yr-bond spread, as well as the order of performance of non-European currencies and market volatilities." The calculator is constructed in the following steps:

1. Estimate a regression of the observed 10-year swap spread on average non-European spreads, the level of American market rates, the slope of the American yield curve, and non-European measures of volatility, using daily data over the sample January 1989-December 1991.

2. Assume that the swap spread is constant over maturities from 2Y to 10Y (in the OUT scenario)

3. Map current observations on the regressors into a level of the spread if out of EMU. The value of such spread can be updated daily, thus at a much higher frequency than Favero et al., which is based on macroeconomic fundamentals updated quarterly.

The main differences between the two calculators are in the way the OUT spread is constructed and the duration of such spread, Favero et al. consider instantaneous forward spreads while J.P. Morgan considers two-year forward spreads. Given that two-year forward rates are average of forward rate, the probabilities computed by J.P. Morgan should be interpreted as the probability of EMU entry on or some time after 1999. However, exactly because two year forward rates are averages of the instantaneous forward rate, two-year forward spreads consistent with the Favero et al. methodology, and directly comparable with those used in the J.P. Morgan calculators, are easily derived. We report such spreads in Figure 1.

Note that the difference between the J.P. Morgan OUT spread and the Favero et al. OUT spread never exceeds thirty basis points over the sample, thus reinforcing the conclusion reached by Bates in his assessment of different term-structure-based calculators.

## 2 Prospects for the future—changing correlations

The last section of Bates' paper analyzes prospects for the future by concentrating on two specific issues:

- Is the Deutschemark/US dollar exchange rate affected by the composition of EMU?
- Is the Euro term-structure affected by the composition of EMU?

On the first issue it is noted that the average Italian-Swedish 1999 forward spread against the DM has fluctuated roughly in tandem with the $/DM exchange rate: narrowing spreads have roughly coincided with a weakening DM.

However, Bates notes also that it is impossible to distinguish the weak ECB-hypothesis from the alternative hypothesis that exchange-rate flucutations reflected German forward-rate fluctuations over the 1992-96 hypothesis. This identification problem could be strengthened by considering the "flight-to-quality" explanations which revert the causal chain by relating the purchase of *safe* German bonds and the sale of *riskier* high-yielder bonds to the weakness of the dollar. Of course, such correlation should disappear as soon as countries like Italy join EMU. Figure 2 shows that this is indeed the case. We report in Figure 2 the long-term expectations of exchange-rate fluctuation between Italy and Germany, as measured by the differential in 10-year fixed interest-rate swaps denominated in Italian lira and Deutschemark, and the spot $/DM exchange rate.

Following Favero-Giavazzi-Spaventa (1997), the 10-year fixed interest-rate swap differential is taken as being free from credit risk, and thus a more

Figure 1: JPMorgan and Favero et al. estimates of the 2-year forward differentials between Italy and Germany in the scenario no-EMU for Italy

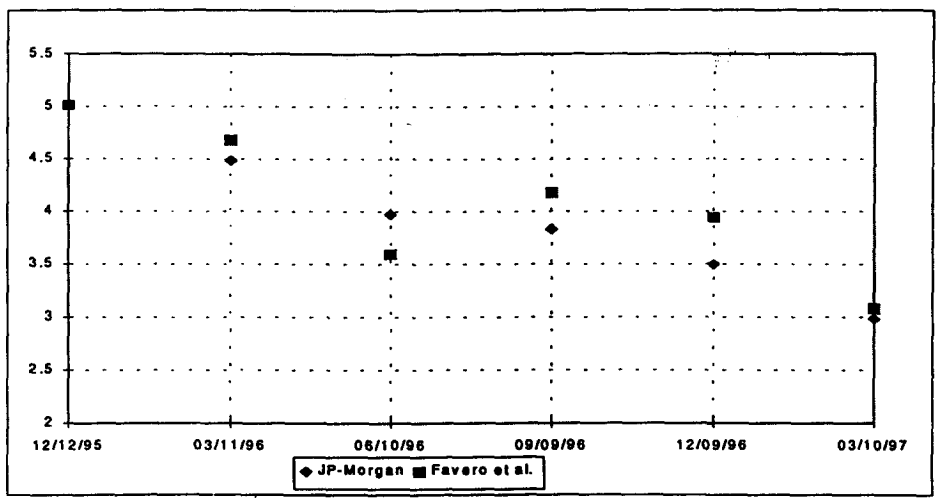
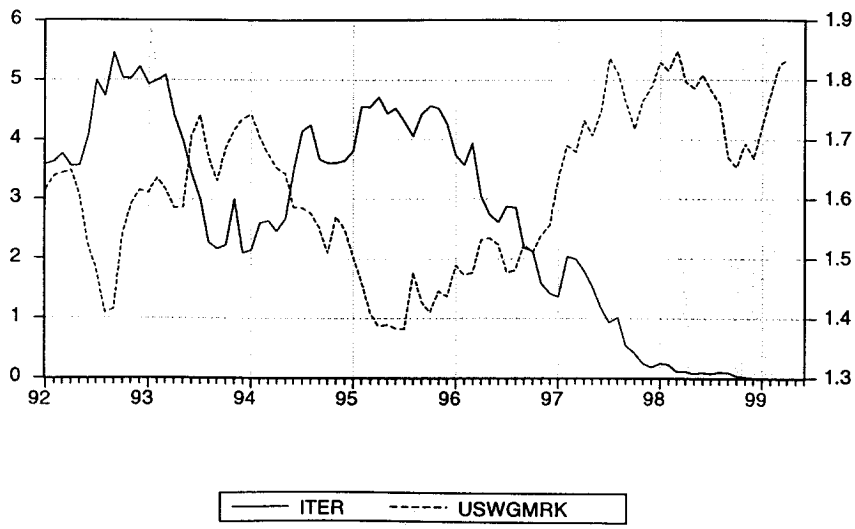


Figure 2: The DM/$ exchange rate(USWGMRK) and the Italian-German fixed ten-year interest rates swap spread(ITER)



direct measure of expectation of exchange-rate fluctuations. From Figure 2 it is clear that the correlation between the spread and DM/$ exchange rate is roughly constant over the period 1995-1998, but it changes drastically from 1998 onwards. We see a constant spread accompanied first by depreciation of the dollar in the second half of 1998 and then by a marked appreciation of the dollar in the first months of 1999.

Bates provides an interesting analysis of the issue of the relation between the composition of EMU and the Euro term-structure based on a state-space representation of the vector of Eurocurrency deposit rates and swap rates for Germany instruments estimated prior to January 1, 1999. The estimation allows the derivation of a pre-1999 norm for the term structure, to be compared with a post-1999 norm. The analysis shows that the term structure at the beginning of 1999 is unusually flat by German standards, but that flatness is consistent with how German short-rates have historically evolved.

My comment on this aspect of the paper is that the historical evolution of the German term structure might have depended heavily on the different relation between German and US interest rates at different maturities, and that an analysis of German rates independently from US rates might suffer from biases due to omitted variables.

This point is shown graphically in Figure 3.1-3.3, where we report German and US short (3-month) and long (yields to maturity of 10-year benchmark bonds) interest rates, together with the slope of the German term structure (ratio of 10-year yield to maturity to 3-month rates) plotted along ITER, the measure of expectation of exchange-rate fluctuations between the Italian-lira and the Deutshemark discussed above.

The close association between German and US rates at the long end of the term structure, paired with the lack of a stable correlation between German and US interest rates at the close end of the term structure, is capable of explaining the fluctuations in the slope of the German term structure. Note also that, as for the DM/$ fluctuations, it is very difficult to establish a stable correlation between participation of peripheral countries to EMU and the slope of the term structure. Once again, historical correlations are not very helpful in interpreting data under the new regime: in the first months of 1999 we observe some evidence for a *decoupling* at the long end of US and German term structure, which has never been observed over the period 1992-1998.

To summarize my comments, I believe that despite all their limitations, term-structure-based and nonstandard calculators are a useful tool to infer from financial data the probability of specific countries joining the EMU, while structural breaks might render the use of financial data in the pre-EMU regime not appropriate to understand the behavior of financial markets

Figure 3: The slope of the German term structure (10Y/3M) and the Italian-German spread on fixed interest-rates swaps(ITER)

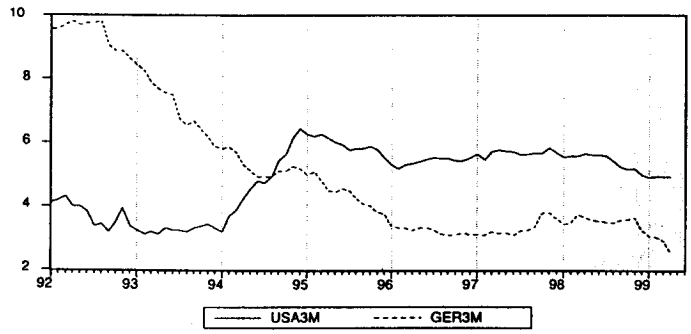



Figure 3.1: German and US short term (3-month) rates

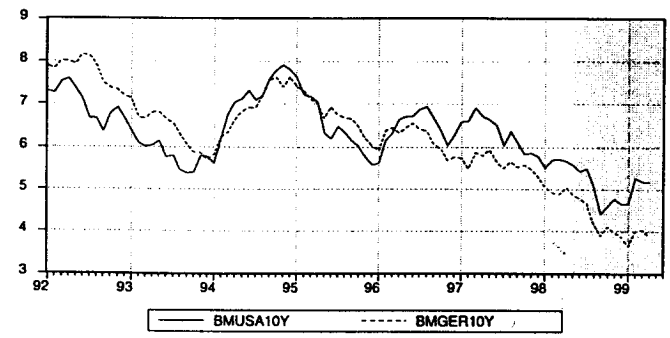
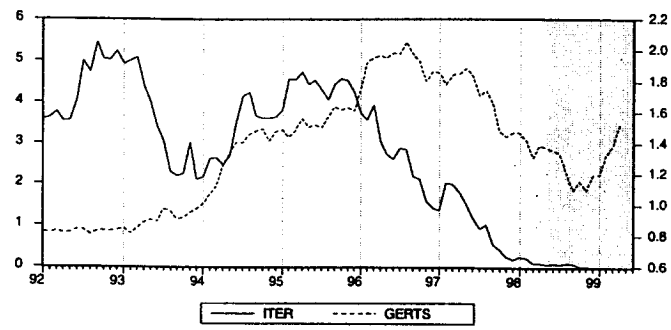



Figure 3.2: German and US long-term(10-Year) rates



within the EMU regime. Modelling the financial structure jointly with the open-economy macroeconomic structure might offer a solution for a better understanding of the changing correlations.

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