# FRBSF ECONOMIC LETTER

# Convergence of Long-Term Bond Yields in the Euro Area

Following years of negotiations involving over a dozen European nations, the Maastricht treaty was signed on February 7, 1992, and established the terms and basic timeline for European Economic and Monetary Union (EMU). Despite some bumps along the way, such as the exchange rate mechanism (ERM) crisis in September 1992, the monetary union went ahead largely according to schedule. On January 1, 1999, the exchange rates for the countries entering monetary union were irrevocably fixed and their financial markets switched over to the euro. On January 1, 2002, monetary unification of the initial member countries was completed, with the cash and coin of each country replaced with newly issued euro-denominated notes and coins.

Although EMU had a number of very visible effects, one of the most striking for economists and financial market participants was the dramatic convergence of long-term bond yields across countries as the date of monetary union approached (see Figure 1). In this *Economic Letter*, I take a closer look at the effect of EMU on long-term government bond yields in the four largest euro zone countries: France, Germany, Italy, and Spain.

### The Maastricht criteria
The 11 countries initially scheduled to join the union (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Spain, and Portugal) differed in many respects. They spoke among them a countless number of dialects of at least eight different languages. Labor mobility across countries was virtually nonexistent. In 1991, the year before the Maastricht treaty, inflation ranged from 3.1% in France to 6.3% in Italy, government deficits ranged from 2.9% of GDP in France and Germany to 11.4% in Italy, and government debt ranged from 20% of GDP in Germany to 92.5% in Italy. As Figure 1 shows, long-term interest rates ranged from 8.5% in Germany to 12.5% in Italy.

Uniting such a diverse group of countries under one common monetary policy posed daunting

**Figure 1**
**Ten-year zero-coupon bond yields for France, Germany, Italy, and Spain**
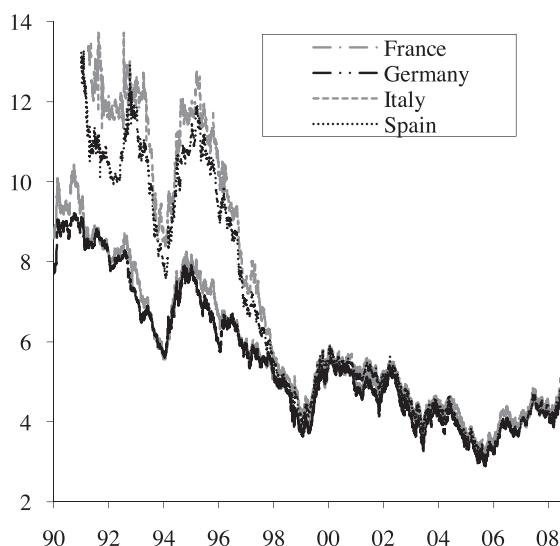


Source: Ehrmann et al. (2007).

challenges. To reduce the economic and political strains as much as possible, the Maastricht treaty laid out several economic criteria that any would-be EMU member needed to satisfy. For example, a country's inflation rate could be no more than 1.5% above the average rate in the three EMU countries with the lowest inflation rates; its government budget deficit could be no more than 3% of GDP; and its government debt could be no more than 60% of GDP (this was later relaxed to allow countries that were "approaching" 60% to qualify). These criteria were meant to impose a minimum degree of economic similarity across EMU nations going into the unification process. Throughout most of the 1990s, however, it was far from obvious that every signatory of the treaty would ultimately be able to meet the criteria and qualify for the union. It is against this backdrop that the convergence of long-term government bond yields in Figure 1 took place.

### Convergence of long-term government bond yields
Figure 1 is remarkable in four main respects. First,

the magnitude of the convergence in long-term bond yields in France, Germany, Italy, and Spain is simply amazing, given how far apart yields in those four countries began the period. In 1991, long-term government yields in Italy averaged 12.5%, while those in Germany averaged 8.5%. By the time of unification on January 1, 1999, long-term yields in all four countries lay between 3.9% and 4.2%, a drop of over 8 percentage points for Italy and Spain. To get a feel for the size of this move, imagine 30-year mortgage rates falling by 8 percentage points! By contrast, long-term interest rates in the U.S. fell only 3 percentage points (from 8% to 5%) over the same period.

Second, the convergence of long-term yields in Figure 1 took place gradually over almost a decade, and occurred years before monetary union actually took place. The discussion above helps to explain why: because of the Maastricht criteria, it was not clear that every country that had signed the Maastricht treaty and wanted to enter into the monetary union would ultimately be allowed to do so. There was even uncertainty as to whether EMU would take place at all if enough countries failed to meet the criteria or just withdrew from the treaty for political reasons. These uncertainties gradually diminished as each country made progress in reducing its inflation rate and fiscal imbalances and as the date of the monetary union drew ever closer. As it gradually became more likely that the bonds in these four countries would be converted into euros together, financial markets gradually began to price them as closer substitutes, driving their yields together.

Third, the bond yields of all four countries in Figure 1 have been remarkably low and stable since EMU took place. This is surprising if one thought that the policies of the European Central Bank (ECB) would be some kind of average of the policies of its member nations. Quite the contrary, long-term interest rates in the euro zone under the ECB appear to be as low as, or even lower than, they were in Germany under the Bundesbank. This result is consistent, however, with the general observation that central banks that are more independent from elected politicians are better able to maintain low and stable inflation (Rogoff 1985, Alesina 1988); this, in turn, implies low long-term interest rates because nominal bonds are less likely to have their value eroded. Thus, the ECB's commitment to low and stable inflation appears to have been very credible.

Fourth and finally, since late 1997, the four bond yields in Figure 1 have tracked each other extremely closely, despite the heterogeneity of each of the government bonds involved. Since the beginning of 1998, the average daily difference between the highest and lowest yields in Figure 1 has been only 20 basis points, and the maximum difference on any single day has been just 54 basis points. Of course, on January 1, 1999, all the bonds in the figure were effectively converted from their legacy currencies into euros, so some degree of comovement is to be expected—after controlling for differences in liquidity and the probability of default, the bonds should carry exactly the same yield, since they are denominated in the same currency. What is surprising is how little premium the market seems to have attached to these bonds for differences in liquidity and default risk, and how strong the comovement was even before monetary union was implemented.

**Monetary policy, exchange rate peg, or fiscal policy?**
The Maastricht treaty laid the groundwork for monetary union, but it also mandated a loose exchange rate peg and required basic convergence of fiscal policies. To what extent, then, is the convergence in long-term bond yields in Figure 1 a result of monetary union as opposed to a reduction in exchange rate risk (through the loose peg) or a reduction in default risk (through fiscal policy convergence)?

The exchange rate peg by itself is probably unable to explain the bond yield convergence in Figure 1. Although the Maastricht treaty originally required countries to keep their exchange rates pegged within a band of plus or minus 2¼% of each other, the ERM crisis in September 1992 led to this aspect of the treaty being revised to allow fluctuations of plus or minus 15%, a much wider band. Because of the large width of this band, exchange rate risk for the four countries in Figure 1 remained high until the last day of 1998, at which point the exchange rates of the EMU countries were fixed at the closing price that day and their currencies were converted to the euro. Moreover, the timing of bond yield convergence in Figure 1 does not seem consistent with the 1990s exchange rate peg playing a major role. For example, from the onset of the ERM crisis to the loosening of the peg on August 2, 1993, bond yield spreads didn't widen, counter to what one would expect if exchange rate risk were the dominant factor. Moreover, from August 1993 through

the end of 1998, the exchange rate band was un-changed at plus or minus 15%, yet cross–country yield spreads both rose and fell substantially over this period, again suggesting that the exchange rate peg was not the main driving force.

To what extent might fiscal policy have been re-sponsible for bond yield convergence? Figure 2 sheds light on this question by plotting long-term bond yields for the three largest U.S. states: California, New York, and Texas. Like the euro zone nations, these three states share a common currency and a unified monetary policy. Unlike the euro zone, there is no equivalent of the Maastricht criteria for U.S. states—their fiscal policies are restricted only by political and market forces.

The comovement of state bond yields in Figure 2 is remarkably similar to the comovement of euro zone bond yields since 1998 in Figure 1. The av-erage daily spread between the lowest and high-est yield in Figure 2 from 1998 through 2007 is just 17 basis points, and the maximum difference is 54 basis points, very similar to the values for the euro zone bonds. Moreover, in Figure 2, the ebb and flow of default risk is clearly discernible: from July 1999 through April 2001, California's fiscal position strengthened as a result of tax revenues from the technology boom of the late 1990s, and California's long-term bond yields averaged about 25 basis points lower than those of New York and Texas as a result. From January 2002 through June 2004, and again more recently, California faced severe budget crises, and its long-term bond yields averaged roughly 25 basis points higher than those of New York and Texas. Thus, the relatively wide swings in default risk in California vis-à-vis New York and Texas seem to account for no more than 50 basis points of yield premium (from −25 to +25) throughout this whole period. Translating this observation over to the euro zone nations in Figure 1 suggests that changes in default risk are probably not a very important part of the con-vergence in bond yields and likely account for less than 1 out of the 8-percentage-point reduction in spreads in the figure. (A final caveat: unlike the euro zone bonds in Figure 1, the state government bonds in Figure 2 receive favorable tax treatment in the U.S., which prevents a direct comparison of yield levels across those figures.)

## Conclusions

In the years leading up to the introduction of the euro on January 1, 1999, European financial

### Figure 2
### Ten-year general obligation bond yields for California, New York, and Texas
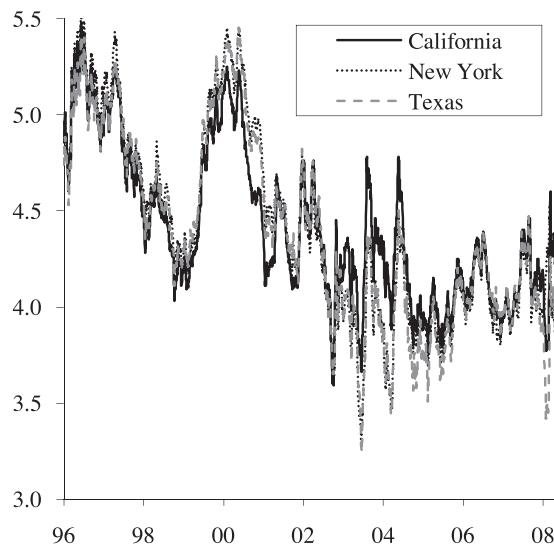


Source: Bloomberg Financial Services.

markets experienced a striking convergence of long-term bond yields, as in Figure 1. The pri-mary forces behind this convergence appear to have been anticipation of monetary union and the credibility of the ECB with respect to its ob-jective of keeping inflation low and stable. Changes in exchange rate risk due to the loose exchange rate peg of the 1990s and changes in default risk due to fiscal policy convergence appear to have played only a minor role. These observations re-inforce the importance of a central bank's credi-bility and commitment to low and stable inflation.

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