

Measuring Term Premia for the Euro Area

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INTRODUCTION

This project aims to compute estimates of term premia for the Euro Area - specifically for the countries Germany, France, Spain and Italy. We will first give empirical estimates for the term premia for the historical series beginning from 2000 to the present. For that we use two approaches - predictive model and consensus forecast (will be explained later). The aim is to estimate the term premia for the present long term Euro area bonds, and also to allow the user to enter the suitable parameters/forecasts to obtain the term premia.

The report gives the procedure used for the computation of the estimates and summarize the results obtained.

THEORETICAL FRAMEWORK

We first underline the theoretical framework used.

Consider zero-coupon bonds and apply the no arbitrage condition to a one-period bond (the safe asset) and a T-period bond:

$$E_t(r_{t,t+1}^T - r_{t,t+1}^1) = E_t(r_{t,t+1}^T - y_{t,t+1}) = \phi_{t,t+1}^T E_t(r_{t,t+1}^T) = y_{t,t+1} + \phi_{t,t+1}^T$$

Solving forward the difference equation $p_{t,T} = p_{t+1,T} - r_{t,t+1}^T$, we have :

$$\begin{aligned} y_{t,T} &= \frac{1}{(T-t)} \sum_{i=0}^{T-1} E_t(r_{t+i,t+i+1}^T) \\ &= \frac{1}{(T-t)} \sum_{i=0}^{T-1} E_t(y_{t+i,t+i+1} + \phi_{t+i,t+i+1}^T) \end{aligned}$$

So we have the following equation for the term spread

$$y_{t,T} - y_{t,t+1} = \sum_{i=1}^{T-t-1} \left(1 - \frac{i}{T-t}\right) E_t \Delta y_{t+i,t+i+1} + \frac{1}{T-t} \sum_{i=1}^{T-t-1} \phi_{t+i,t+i+1}^T$$

PROCEDURE

We can use the term spread equation given above to estimate the term premia. We use the common short-rate for the Euro Area, and the yields on the 10-year government bond yields for the term spread. But the future expected future path of short-term rates is not known and thus we need some approach to estimate $\Delta y_{t+i,t+i+1}$. Once we have it, the term premia can be easily calculated.

To estimate the future path of short-term rates we use two approaches -

1. Predictive Model -

$$\Delta y_{t+1,t+2} = \rho \Delta y_{t,t+1} + \epsilon_{t+1}$$

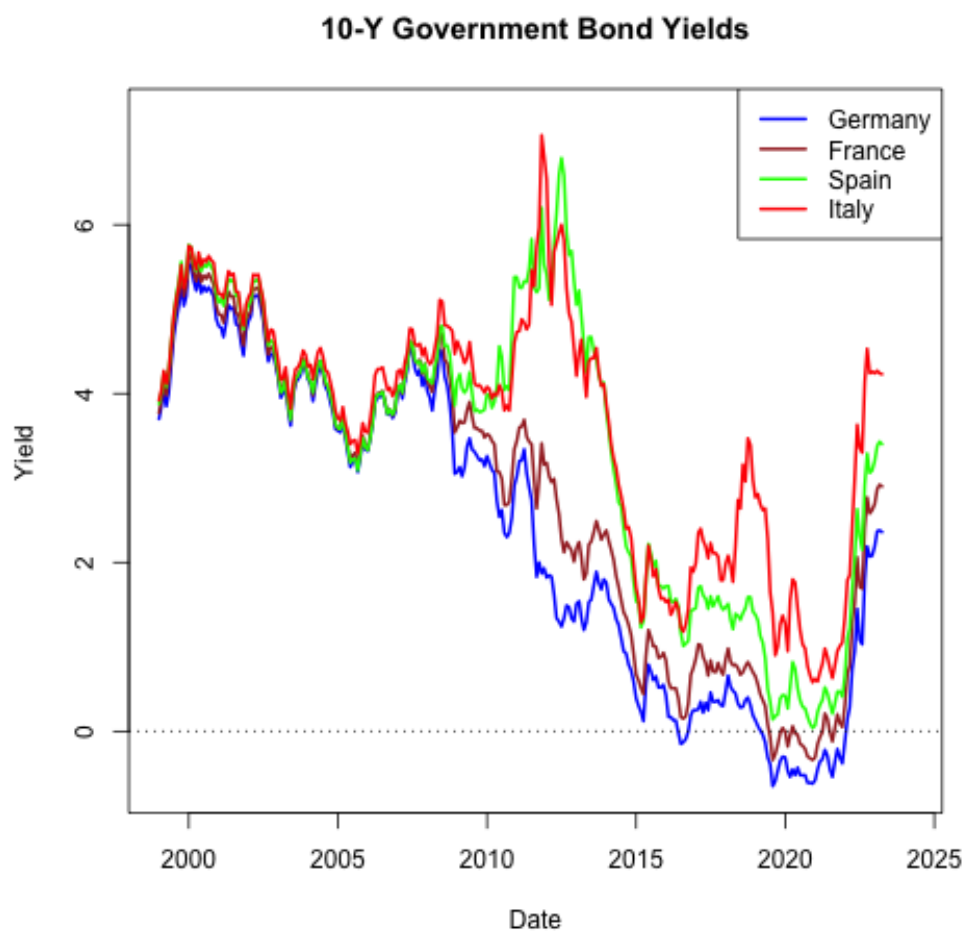
We can estimate ρ using the historical data available. This parameter (assuming it be constant over time) can be used to get the future path of interest rates. While basic it can serve as an excellent baseline model.

2. Consensus forecasts -

The ECB's Professional Forecasters Survey gives the average forecasts for the expected future short-term rates. These can be directly used and compared with our baseline model estimates.

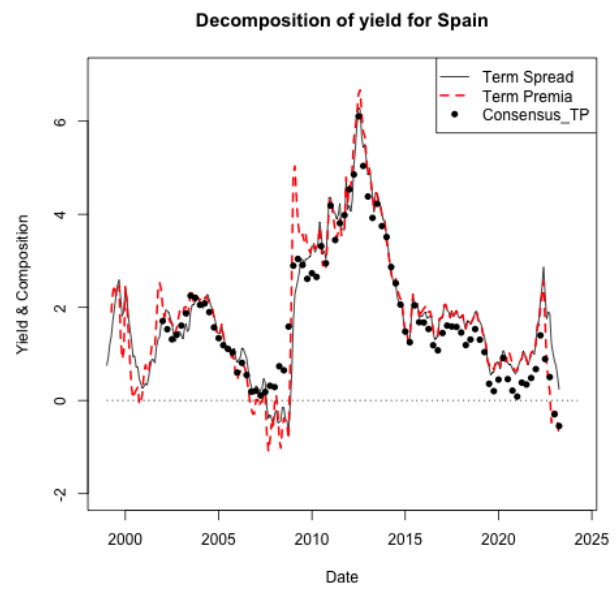
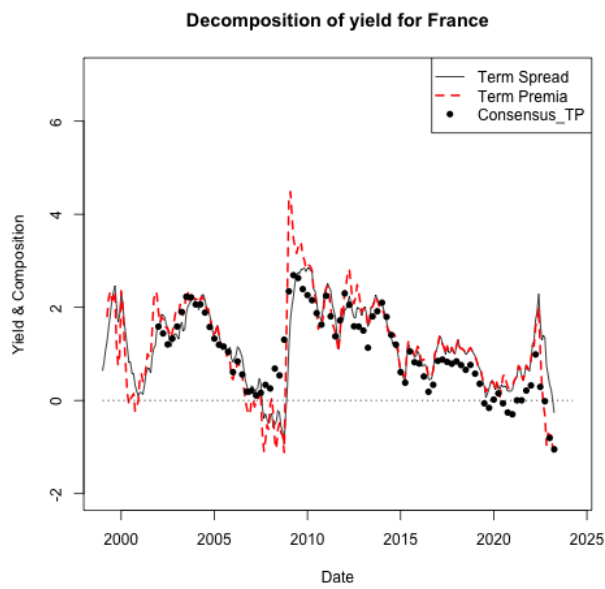
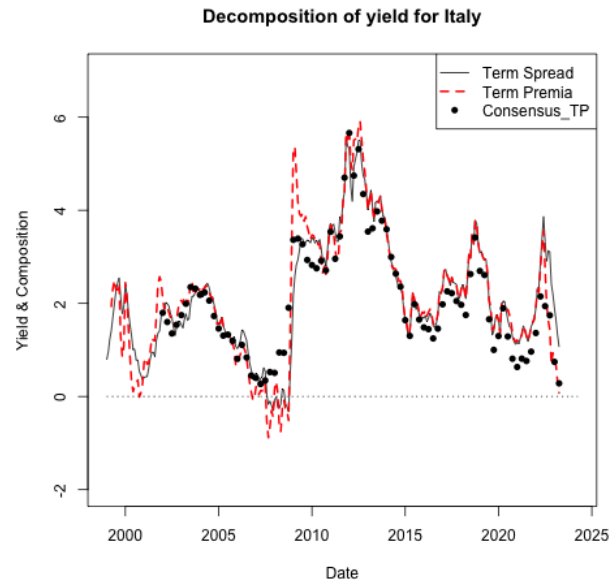
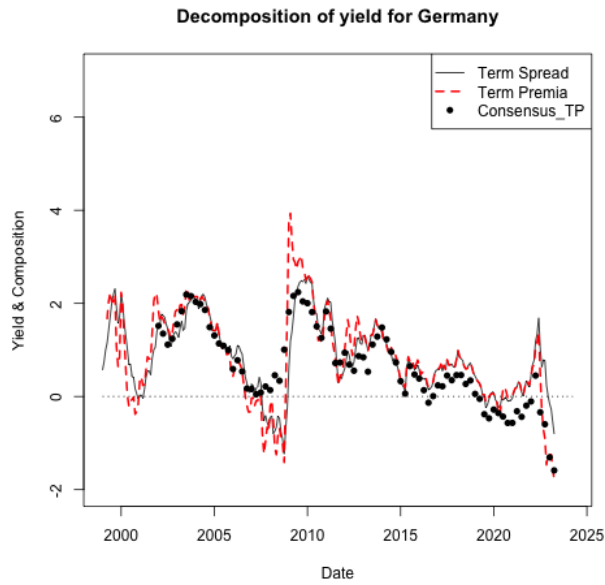
RESULTS

The following plot compares the long-term bond yields of Germany, France, Italy and Spain



We can see one crucial feature - the bond yield were similar across all the countries till 2008 and then diverged, with Italy and Spain having higher long-term-bond yields than Germany and France.

We can also get the yield decompositions for the countries - the term premia are calculated using the two methods described previously.



From the decomposition plots, we can infer that most of the term spread can be explained by the term premia, and the short-rate movements contribute little to the term spread. This has important implications for...

We also see a downward shift of the term premia in the recent years, with it reaching negative values in Germany and France. In Germany, the term premia has been negative since before even 2020. This matches the US experience, showing similarities in term premia across the two regions.

Finally, the following two figures summarise the term premia estimates:

