The Determinants of Sovereign Bond Yield Spreads in the European Debt Market: Discounting the Fixation on Country Fundamentals

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ABSTRACT

There have been significant fluctuations in the relative yields of European sovereign debt in the 2001-2022 period. During the period preceding the Sovereign Debt Crisis, yields on sovereign bonds in most European countries were moving very close together. At the onset of the Sovereign Debt Crisis, there was a significant divergence in sovereign bond yields, and reconvergence to the pre-crisis level has not since been achieved. Variations in yield spreads lead to tightening economic conditions and ineffective transmission of monetary policy for Eurozone countries. In this paper, I investigate the drivers of the yield spread. I find that VIX, the surplus as a percentage of GDP, and real GDP growth are the primary drivers of the yield spread. Additionally, the sensitivity of the yield spread to various risk indicators changes in response to crisis periods, and yield spreads for countries with a relatively low real GDP per capita are more sensitive to shifts in international financial risk. These findings reveal the shortcomings of the fiscal policy that had been implemented during the Sovereign Debt Crisis that focused heavily on improving fundamentals, given the importance of international risk aversion and economic growth in driving the spreads.

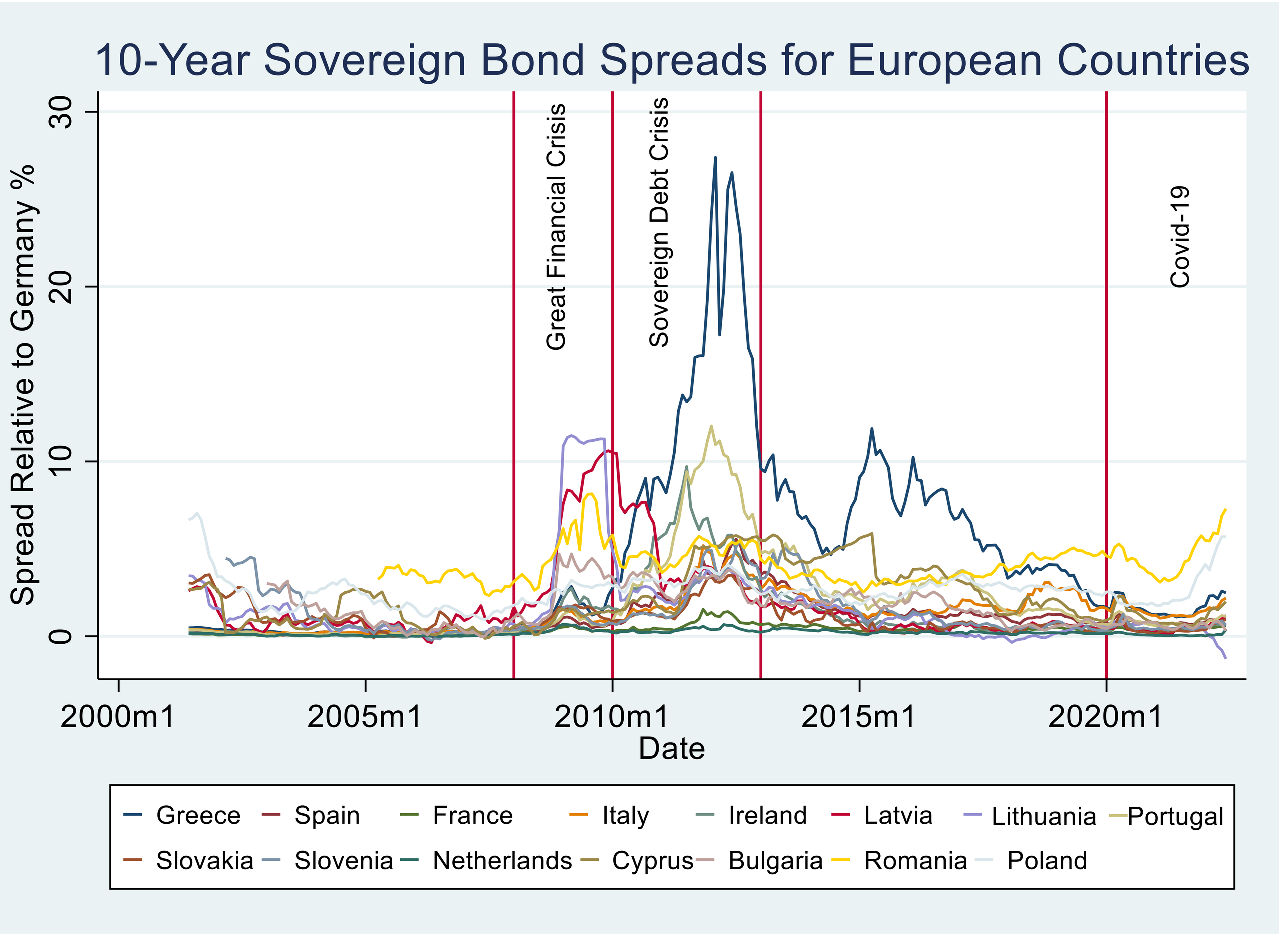
INTRODUCTION

This research paper identifies key drivers of sovereign bond yield spreads to inform policy makers on how to achieve convergence. Identifying the most prominent determinants of sovereign bond spreads illuminates the most appropriate policy actions to mitigate the yield spreads. If the spreads are driven by a liquidity premium, improved debt management and primary and secondary bond market efficiency would reduce the spreads. If the impact of country fundamentals dominates, then policies that impose fiscal discipline to reduce the debt to GDP ratio, the improve the current account position, and reduce the national deficit, should be considered as effective tools at mitigating the spread (Codogno et al, 2003).

This research diverges from past work because of its of the European debt market as opposed to exclusively the Eurozone, and through interpreting investor behavior from the perspective of the CAPM framework, which has many modelling implications. Additionally, I analyze heterogenous effects on the yield spread of a set of risk indicators between countries with a high and low Real GDP per capita.

The literature tends to divide the drivers of sovereign bond yield spreads into Credit Risk, Liquidity Risk, and international risk aversion (Alexopoulou et al., 2009; Poghosyan, 2012). In my analysis, I consider these components as key drivers of the yield spread, but I also consider the impacts of economic activity and real GDP per capita.

Figure 1: **Below is a time series graph for the yield spread of a group of 13 European countries over the 2001-2022 period**



DATA

Dependent Variable

Spread relative to Germany for monthly average interest rate for 10-year government bonds with a remaining maturity of 10 years, quoted as a percentage per annum; provided by EUROSTAT

Independent Variables

Credit Risk: Public debt as a percentage of nominal GDP, external debt as a percentage of nominal GDP, current account as a percentage of nominal GDP, and the surplus as a percentage of nominal GDP**,** Real GDP Growth; Provided by Eurostat, FRED, IMF

International Risk Aversion: CBOE volatility index, which utilizes S&P 500 options prices to determine expected market volatility over the 30-day period after the observation is collected; provided by CBOE

Liquidity Risk: Gross consolidated government debt as a percentage of the total Eurozone/European gross consolidated government debt; own calculation with Eurostat data

Inflation Risk: HICP inflation rate for each Eurozone nation; provided by Eurostat

Exchange Rate Risk: Exchange rate volatility, which is derived from a 20-month rolling regression; Own calculation with Eurostat data

Observations: 6,708

Countries: 26 (258 monthly observations per country)

EMPIRICAL MODEL

Benchmark Pooled OLS Fixed Effects Model

$$YS_{it} = \alpha_i + \beta_1 YS_{it-1} + \beta_2(DGDP_{it} - DGDP_{Gt}) + \beta_3(inf_{it} - inf_{Gt}) + \beta_4(DS_{it} - DS_{Gt}) + \beta_5(RGDP_{it} - RGDP_{Gt}) + \beta_6(CA_{it} - CA_{Gt}) + \beta_7(SurGDP_{it} - SurGDP_{Gt}) + \beta_8(ED_{it} - ED_{Gt}) + \beta_9 vix_t + \varepsilon_{it}$$

$DGDP_{it}$: Public Debt as % of GDP

inf_{it}: HICP mom %change

DS_{it}: Gross Debt as % of Eurozone/European Gross Debt

$RGDP_{it}$: Monthly Growth Rate in Real GDP

CA_{it}: Current Account as % of GDP

$SurGDP_{it}$: Surplus as % of GDP

ED_{it}: External Debt as % of GDP

vix_t: CBOE Volatility Index

The benchmark model is modified to incorporate time dummy variable interactions to illustrate the unstable relationship between a subset of risk factors and the yield spread during key crisis periods. The VIX, Surplus as % of GDP, Public Debt as % of GDP, and Real GDP Growth are interacted with the time dummy variables

Error Correction Model

The error correction model allows for the parsing out of long-term and short-term coefficients. The model provides insight into which variables have a relationship with the yield spread in the long-term.

$$\Delta YS_{it} = \sum_{i=1}^{I} \delta_i \Delta x_{it} - \emptyset_i(YS_{it-1} - \alpha_i - \beta_i x_{it-1}) + \varepsilon_{it},\ \emptyset_i \in (0,1)$$

$\emptyset_i$: error correction coefficient (how fast there is a return to equilibrium)

$\sum_{i=1}^{I} \delta_i x_{it}$: represents all explanatory variables with their corresponding coefficients in the model

Table 1: Crisis Period Interactions

Key Variable	Main Effect	Great Financial Crisis	Sovereign Debt Crisis	Covid-19 Pandemic
VIX	0.00551*** (0.000)	-7.09e-05 (0.925)	0.0070*** (0.000)	-0.000625 (0.333)
Public Debt as % of GDP	0.000707** (0.0318)	0.00175*** (0.0005)	0.0032*** (0.000)	-0.000523 (0.138)

Table 2: RGDP per Capita Interactions

Key Variable	Main Effect	Effect of above average RGDP per capita
VIX	0.00947*** (0.000)	-0.00716*** (0.000)

Table 3: Benchmark and Error Correction Model

Variables	Benchmark (Total Sample)	Benchmark (Eurozone)	Error Correction for Total Sample (Long Term)	Error Correction For Eurozone (Long-Term)
Lagged Bond Spread	0.974*** (0.000)	0.979*** (0.000)	Not Included	Not Included
VIX	0.00648*** (0.000)	0.00451*** (0.000)	0.164*** (0.000)	0.0288*** (0.000)
RGDP Growth Rate	-0.00474* (0.0948)	-0.0275*** (0.000305)	0.0279 (0.651)	-0.129** (0.0328)
Surplus as % of GDP	-.00357*** (0.000174)	-0.00255** (0.0351)	-0.124*** (1.54e-06)	-0.00943 (0.178)
Public Debt as % of GDP	-.000318 (0.242)	-0.000312 (0.360)	-0.0195** (0.0120)	-0.00198 (0.453)
Euro Debt Size	Not Included	0.000862 (0.894)	Not Included	0.0522 (0.308)
Current Account as % of GDP	-0.000677 (0.189)	-0.00180* (0.0910)	-0.00991 (0.449)	-0.0312*** (1.17e-05)
Inflation Rate	-.0.00810 (0.196)	-0.0148* (0.0533)	-0.152 (0.480)	0.105 (0.130)
Exchange Rate Volatility	1.09e-05 (0.805)	Not Included	0.000923 (0.478)	Not Included
External Debt as % of GDP	Not Included	6.14e-06 (0.916)	0.00186 (0.337)	-0.00190** (0.0427)
EU Debt Size	0.00119** (0.0274)	Not Included	0.0201 (0.247)	Not Included

RESULTS

VIX, the surplus as a percentage of GDP, and real GDP growth are significant drivers of the yield spread across most models (See Table 3).

The impact of VIX on the yield spread increased during the sovereign debt crisis.

The impact of Public Debt as a % of GDP increased during both the Great Financial Crisis and the Sovereign Debt Crisis (see Table 1).

Having above average Real GDP per capita in the sample reduces the impact of the VIX by 0.7 basis points (See Table 2).

CONCLUSION

The findings from this research suggest the importance of real GDP growth and international risk aversion in driving the yield spread. Although country fundamentals are a significant driver of yield spreads, austerity programs that improve country fundamentals and impose fiscal discipline have the potential of stifling economic activity and increasing the yield spread in the long-term. Policies focused on forward guidance to quell market fears of financial instability should be considered to reduce the impact of international risk aversion on the yield spread. Additionally, governments should consider the impacts on economic growth from imposing fiscal discipline, because of the relevance of real GDP growth and Real GDP per capita in driving yield spreads.

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