Economics Bulletin

Volume 33, Issue 2

Macroeconomic, financial and institutional determinants of Eurozone sovereign crisis - Evidence from daily data

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Abstract

We empirically investigate the determinants of sovereign bond spreads in the euro area since the beginning of the crisis. We combine economic but also political uncertainty variables for three different groups of countries. We took into account an institutional shift in the spring 2010. Before the institutional shift, Greek bond yield spreads are explained by international factors more than by the market discipline. It appears that some institutional variables influenced the spreads. The ECB's communications relating to the sovereign bond crisis contribute to feeding it whereas meetings of the European Council contribute to lowering the spreads for the countries less affected by the crisis.

The authors thank Christophe Blot, Benoit Detollenaere, and all the members of the PPS research unit. Remaining errors are the sole responsibility of the authors.
Citation: Jean-yves Filbien and Fabien Labondance and Yann Echinard, (2013) "Macroeconomic, financial and institutional determinants of Eurozone sovereign crisis - Evidence from daily data", *Economics Bulletin*, Vol. 33 No. 2 pp. 1170-1176.
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Submitted: February 03, 2013. **Published:** May 13, 2013.

1. Introduction

In this short contribution we point out the main determinants of high-frequency evolutions of sovereign bond yield spreads in the Eurozone. The sustainability of the Eurozone has been an issue since the beginning of the sovereign bond crisis in Greece in autumn 2009. In the long run, determinants of sovereign bond spreads are mainly macroeconomic and financial. They are traditionally caused by three main risks: a credit risk, a liquidity risk and the investors' risk aversion. However in the short term, and even more so at a time of crisis, a country's credibility has a huge impact on the economic agents' view to fix the sovereign-risk premium included in bond yields. In addition to macroeconomic and financial variables, it seems important to take into account the impact of shocks provided by political decisions, in particular decisions taken by the European macroeconomic institutions. In this analysis, we thus combine economic but also political uncertainty variables to explain the sovereign bond yield spreads in the Eurozone since the crisis.

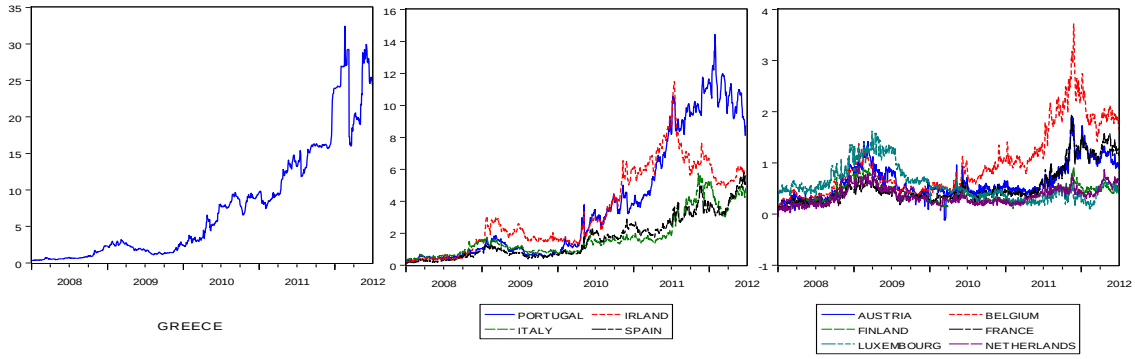
The literature on the determinants of Eurozone sovereign spreads is mainly focused on the long run perspective. It clearly shows that both macroeconomic (mainly fiscal) and financial variables determine sovereign risk. It also describes that these relationships are non-linear. Two different regimes are often described: a crisis and a non-crisis regime. In this contribution, we go beyond this classification and isolate different periods during the crisis regime. Particularly, the institutional shift induced by the European Central Bank (ECB), the European Council and the International Monetary Fund in May 2010 have to be taken into account.

2. Data and Methodology

Our objective is to determine on a high frequency (*i.e.* daily) what are the determinants of the sovereign bond yields spreads in the Eurozone. Our variable of interest is thus the sovereign bond yield spread of several European countries. We use the sovereign bond yields of eleven Eurozone countries: Austria, Belgium, Spain, Finland, France, Ireland, Italy, Greece, Luxembourg, The Netherlands and Portugal. Our sample begins January 1st 2008 and ends June 30th 2012. The yield spread is calculated on a daily basis as the differential between the 10-year yield of each country and the German bond yield of the same maturity. These data are provided by the Eurostat database. The evolutions of the ten-year sovereign bond yields spreads are reproduced in figure 1.

Three groups of countries can be distinguished according to their exposure to the crisis. The first group refers to Greece, the first and most exposed country. Progressively, because of spillover and contagion effects, the sovereign crisis was transmitted to four other countries: Portugal, Ireland, Italy and Spain (PISI). Finally, the other countries of the Eurozone 12 constitute a third group of countries less affected by the crisis (CLAC).

Figure 1: Evolution of the ten-year sovereign bond yields spreads



Source: Eurostat

Figure 1 reminds us that since the beginning of the sovereign bond crisis, different periods can be isolated according to the evolutions of the sovereign bond yield spreads. Indeed, we can isolate a break at the end of spring 2010 in particular. This break was induced by the decisions taken on a European level and seems to have impacted the evolution of the spreads. In May 2010, the Eurozone faced what we could call an institutional shift.

Without going into too much detail, we can mention that two major institutional evolutions occurred that month. The first one was induced by the ECB: with a new interpretation of its status it decided to suspend the application of the minimum credit rating threshold in the collateral eligibility. In clear, the ECB decided to always accept Greek bonds even if the bond's rating announces a high probability of default. It was perceived as a new interpretation of the "no bailout rule" specified in the European Treaty. The second is the constitution of the European Financial Stability Facility (EFSF), created by a decision of the member states. In providing a financial assistance to Eurozone's member States that need it, it creates a new step toward fiscal federalism.

These two measures constituted an important institutional shift and this break has to be kept in mind. Table 1 presents the descriptive statistics of the sovereign bond yields spreads according to the three groups of countries and to the institutional shift. We can observe the differences, especially the evolution of the standard deviation before and since the institutional shift that clearly shows the contagion process from Greece, to the PISI group and, in some extend, to the CLAC group.

Table 1: Descriptive Statistics of the sovereign bond yield spreads

	All the Period			Before the institutional shift			Since the institutional shift		
	Greece	PISI	CLAC	Greece	PISI	CLAC	Greece	PISI	CLAC
Mean	7,62	2,66	0,58	1,97	0,99	0,48	14,70	4,76	0,69
Maximum	32,44	14,44	3,72	8,08	3,79	1,62	32,44	14,44	3,72
Minimum	0,30	0,07	-0,12	0,30	0,07	-0,12	6,57	1,22	0,10
Std. Dev.	7,78	2,67	0,43	1,52	0,63	0,28	6,58	2,76	0,54

The literature identified numerous variables that explained the government bond yield spreads. Traditionally they can be divided into three types of risks explaining the level of the risk premium included in the sovereign bond yield: a credit risk, a liquidity risk and an international risk aversion. In addition we take into account the influence of the European macroeconomic institutions' decisions on the evolution of the sovereign bond spreads.

To measure the credit risk, we take the fiscal performance of each country. We use two types of variables: the projected deficit (for the next year) and the debt to GDP ratio. These two variables are usually employed in the literature (see Bernoth and Erdogan, 2012). The projected deficit allows us to take into account the agents forward looking behaviour. Moreover, the current deficit includes interest rate payment. In using the projected deficit, we then avoid a potential endogeneity bias. The projected deficit is published twice a year by the European Commission. The debt to GDP ratio is provided by Eurostat on a quarterly basis. We include these variables in levels and in quadratic terms because the effects of fiscal variables are generally found to be non-linear (see Bruneau, Delatte and Fouquau 2012). This is called a « credit punishing effect » (see Bayoumi, Goldstein and Woglom 1995) and indicates that interest rate spreads grow non-linearly. In including the squared projected deficit and the squared debt to GDP ratio we capture both the credit risk effect and the credit punishing effect. We also include variables relating to the countries' economic activity and competitiveness. To avoid colinearity problems with the debt to GDP ratio, we didn't proxy economic activity with the GDP but with the unemployment rate. And we use the unit labour cost to proxy competitiveness[1]. These data are provided by Eurostat. Macroeconomic variables are expressed in differences to the corresponding figures of the benchmark country, Germany.

We also include financial variables to evaluate a liquidity risk and an international investors' risk aversion. Liquidity risk is the size of each government's bond market measured as the share of total outstanding Euro-denominated long-term government securities issued in the Eurozone. These data are provided by the ECB on a monthly basis. Following Favero, Pagano and von Thadden (2010), we use the corporate bond yield spread as a proxy for international risk aversion. It is computed as the spread between US AAA coporate bonds and US-10 year sovereign bonds. Data are provided by Datastream on a daily basis.

[1] We also proxy competitiveness with the trade balance and results are similar.

The different variables described previously are those frequently used in the literature[2]. In addition, we integrate variables that relate to the Eurozone' economic institutions to capture the political uncertainty. Our goal is to assess whether or not the meetings of the Eurozone's economic main institutions and their communication had an impact on the sovereign bond yield spreads. We then identify the days of such meetings for the four main institutions of the European macroeconomic governance: the European council, the Ecofin, the Eurogroupe and the ECB. For the ECB, we distinguish communications on the European monetary policy and communications on the sovereign bond crisis. We then include a dummy variable for each meeting.

Our empirical methodology is the following. The dependent variable is the sovereign spread. Explicative variables are those listed previously and intend to capture several risks: credit, liquidity, international risk aversion and risks related to the decisions taken by the Eurozone's economic institutions.

In the spirit of Barrios, *et al*. (2009) estimations are conducted via OLS with daily data separately for each group of countries: Greece, PISI and CLAC. The analysis period starts January 1st 2008 and ends June 30th 2012. We also estimate this model on sub periods taking into account the institutional shift at the end of spring 2010. For PISI and CLAC, we estimate a standard OLS fixed effects panel data model as it was done notably by Bernoth et Erdogan (2012).

3. Results

Our results are reported in Table 2. They appear to be heterogeneous when we take into account both the differentiation between countries and the institutional shift. There are thus clear signs of regime switching after the institutional shift.

The Greek case is unique in regards with the situation of its other European partners by its main determinants and by their magnitude. We show that on the overall period, fiscal variables are not the main determinants that explain the Greek spread. Financial risks such as liquidity risk and International risk aversion explain it. These later results are in line with previous findings in the literature (see Longstaff, *et al.* 2007).

The institutional shift clearly determines a shift also in the spreads determinants, especially for Greece. Since the set-up of the EFSF, the Greek long-term interest rate is less relevant and we will not discuss this period for Greece in detail. However, before that, we found that the main driver of the sovereign bond spreads between the start of the crisis and the institutional shift is clearly the international risk aversion. This variable is significant and positive for all the countries included in this analysis.

The inclusion of institutional variables reveals some interesting facts. Only two institutions seem to have an impact on the sovereign bond spreads. These are the two main institutions that represent the fiscal and the monetary power: the European Council and the ECB. More precisely concerning the ECB, this is its communication about the sovereign bond crisis which influences

[2] An issue with these data is that they are available at best on a monthly basis. We then conduct data manipulations. To convert them into daily frequencies we used a local quadratic with an average matched to the genuine data. This transformation (conversion) was applied to all the macroeconomic data, except the projected deficit.

significantly the bond spreads. We show that between January 2008 and June 2010, ECB's communication regarding the sovereign bond crisis contributes to increasing the spreads for all the countries. During the same period, we found that the European Council had a peaceful effect, but only for the CLAC.

Finally, in observing the results since the institutional shift, we can see that fiscal variables became highly relevant for the PISI and the CLAC groups whereas the institutional variables are no longer significant. We then identify a contagion effect and a return of the market discipline for these countries (see Caggiano and Greco 2012).

Table 2: Determinants of sovereign yield spreads in the Eurozone: evidence from daily data (January 2008-june 2012)

	All the Period			Before the institutional shift			Since the institutional shift		
	Greece	PISI	CLAC	Greece	PISI	CLAC	Greece	PISI	CLAC
Constant	**-4,68*** **	**1,51*** **	**-0,63*** **	**31,01*** **	**1,31*** **	**-1,13*** **	**-60,21*** **	**-3,62*** **	**-1,03*** **
Projected Deficit	**-0,29** **	**0,17*** **	**-0,01** **	**-0,25*** **	**0,02** **	**-0,01*** **	**-8,50*** **	**0,47*** **	**0,13*** **
Squared Projected Deficit	**-0,02** **	**-0,01*** **	**-0,00*** **	**0,02*** **	-0,00	-0,00	**0,60*** **	**0,03***	**0,04*** **
Debt	-0,06	**0,03*** **	**-0,02*** **	**-1,18*** **	**0,04*** **	**0,02*** **	**0,70*** **	**0,06*** **	**-0,02*** **
Squared Debt	**-0,00***	**-0,00*** **	**-0,00*** **	**-0,01*** **	**-0,00*** **	**-0,00*** **	**0,01*** **	**0,00*** **	0,00
Unit Labor Cost	**-0,04*** **	**-0,24*** **	-0,00	**-0,08*** **	**-0,07*** **	**-0,00*** **	0,08	**0,29*** **	0,01
Unemployment	**1,67*** **	**0,51*** **	**0,14*** **	**0,31*** **	**0,13*** **	**0,08*** **	**1,81*** **	**-0,80*** **	**-0,04*** **
Liquidity	**1,56*** **	**-0,63*** **	**0,13*** **	**-1,21*** **	**-0,25*** **	**0,14*** **	**2,41*** **	**-0,44*** **	**0,17*** **
International Risk Aversion	**1,15*** **	**0,68*** **	**0,42*** **	**0,81*** **	**0,48*** **	**0,44*** **	**-0,18**	**0,49*** **	**0,28*** **
European Council	0,08	0,02	-0,02	-0,05	-0,05	**-0,03** **	0,37	-0,02	0,00
Ecofin	-0,20	0,03	0,00	-0,04	-0,03	0,00	0,01	0,03	0,02
Eurogroupe	-0,13	-0,02	0,01	-0,01	0,01	0,00	-0,12	-0,08	0,00
ECB Bond	0,41	0,14	**0,05***	**0,45*** **	**0,36*** **	**0,07*** **	0,54	0,11	0,01
ECB Monetary Policy	-0,07	-0,02	-0,02	-0,04	0,00	0,00	-0,14	-0,08	-0,03
N	1174	4696	7044	653	2612	3918	522	2088	3132
R2 Adjusted	0,96	0,87	0,51	0,95	0,70	0,73	0,89	0,86	0,78

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4. Conclusion

In this short contribution, we present a simple high-frequency framework between 2008 and June 2012 that takes into account countries specific effect, traditional macroeconomic and financial determinants of the sovereign bond yield spreads. We also take into account the non-linearity relationship. Moreover, we add institutional variables and we keep in mind that the Eurozone encountered an institutional shift in May 2010.

We found several results. (I) The main determinants of Sovereign bond yield spreads are different depending on the group of countries examined. (II) We show that the reforms set up by the European Economic institutions at the end of spring 2010 create a switching regime. (III) Since the beginning of the crisis and to this institutional shift, market discipline was not the main determinant of the sovereign bond spreads. International factors such as liquidity risk and investor's risk aversion prevailed. (IV) We also show that some European institutions had a significant impact. ECB's communication on the sovereign bond crisis contributed to feeding it whereas the meetings of the European Council contributed to lowering the spreads for the countries less affected by the crisis. (V) Finally, we can observe that a contagion effect is at work. Fiscal variables are indeed more and more relevant to explain PISI's and CLAC's sovereign bond yield spreads.

These results called for numerous prolongations. It seems particularly important to observe more closely the impact of the economic institutions meetings in the build-up of the crisis. An event-study can be useful. Moreover, we identified a regime change during our analysis period probably due to political factors. During the same period, we only partly took into account the role of nonlinearities. A more complete analysis of these nonlinearities would help us to understand more precisely the different regime switching that occurred since the beginning of the sovereign bond crisis.

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