BANK OF GREECE
EUROSYSTEM

Special Conference Paper

The crisis in the euro area, May 23-24, 2013

How much fiscal discipline in a monetary union?

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JULY 2013

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Printed in Athens, Greece
at the Bank of Greece Printing Works.

ISSN 1792-6564

Editorial

On 23-24 May 2013, the Bank of Greece organised a conference on "The Crisis in the Euro Area", in Athens.

The papers and commentaries presented at the conference addressed many important issues related to the functioning of the euro area. Our hope is that these contributions will help improve understanding of the nature of Europe's monetary union, the underpinnings of its crisis, and the changes that are needed so that crises will be prevented in the future.

The papers examined two main sets of issues. One group of papers, adopting a union-wide perspective, assessed the aspects of the euro area's institutional architecture that, with the benefit of hindsight, may have contributed to the crisis, and the policy responses to the crisis at the union level. A second group of papers focused on developments in three crisis countries -- Greece, Ireland, and Portugal.

The papers presented at the conference, with their discussions, will be published in the *Journal of Macroeconomic*s.

Here we present the paper by Paul De Grauwe (London School of Economics) and Yuemei Ji (University of Leuven) with its discussion by George Hondroyiannis (Bank of Greece and Harokopio University).

HOW MUCH FISCAL DISCIPLINE IN A MONETARY UNION

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ABSTRACT

The nature of fiscal policies was changed dramatically by the creation of the Eurozone. While prior to the start of the Eurozone, national governments were sovereign in that they could back up the issue of debt by the issue of money, they lost this sovereignty in the Eurozone. This had dramatic effects that were largely overlooked by the designers of the Eurozone. First it made self-fulfilling liquidity crises possible that degenerated into solvency crises. Second, it led to the imposition of intense austerity program. We provide empirical evidence for these two effects. We argue that contrary to what was expected, i.e. that a monetary union loosens fiscal discipline, it actually leads to too much fiscal discipline.

Keywords: fiscal policy, austerity, Eurozone, EMS

JEL Classification: E42, E58, F33, F36

Acknowledgements: We are grateful to the participants of the conference for many useful comments and suggestions and in particular to our discussant, George Hondroyiannis.

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1. Introduction

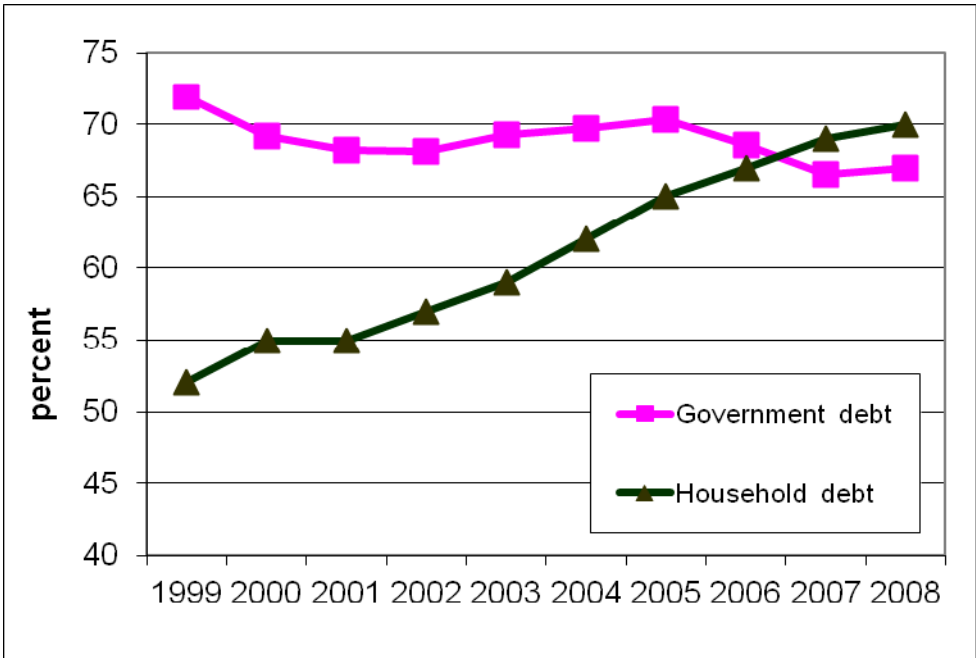
What kind of fiscal policies in a monetary union? This is one of the most researched questions in the literature of optimal currency areas. The dominant view that has emerged from this literature is that national governments of member countries of the union should be subjected to additional budgetary discipline compared to stand-alone countries. This conclusion is based on two types of models. The first one relies on moral hazard. Governments in a monetary union are more likely to profit from an implicit (or explicit) bailout guarantee than stand-alone countries. Such a guarantee inevitably leads to moral hazard risk and thus necessitates additional budgetary discipline and a control mechanism that will enforce discipline. The second model is based on a common pool argument. Member countries of a monetary union "fish from the same pool of financial capital". This will then lead to overfishing, i.e. to excessive issue of government debt. The same conclusion follows: in a monetary union, governments of member countries must be subjected to a control mechanism that enforces budgetary discipline.

This analysis has been very influential. It has led to designing control mechanisms on national fiscal policies aimed at maintaining budgetary discipline in the Eurozone. Thus since the outbreak of the sovereign debt crisis in the Eurozone, the Stability and Growth Pact (SGP) has been tightened considerably, including the imposition of quasi-automatic sanctioning of governments which fail to abide by the rules. New control procedures have been added in the context of the so-called six-pack and two-pack legislations. Finally, member countries have accepted to introduce balanced budget rules in their national legislations (the Fiscal Pact).

The surprising thing about this emerging new governance of the budgetary processes in the Eurozone is that there is so little evidence that the fiscal crisis that erupted after 2008 was the result of government profligacy prior to that date. In Figure 1 we show the evolution of government and household debt (as a percent of GDP). The striking feature is that the government debt ratio in the Eurozone was on a (slightly) declining path, while the household debt ratio increased steeply. Thus the existence of the Eurozone does not seem to have triggered government profligacy as predicted by moral hazard and common pool theorists. Note that this was a time when the SGP was

considerably more flexible than today, and the six-pack, two-pack and fiscal compact did not exist. That is, the disciplinary mechanism that according to the moral hazard and common pool theorists should be in place to prevent government indiscipline in a monetary union did not exist. Yet despite the absence of disciplining devices, the government debt to GDP ratio in the Eurozone was on a declining path. If there was profligacy prior to the crisis it was among private households.

Figure 1: Government and household debt GDP ratio in Eurozone

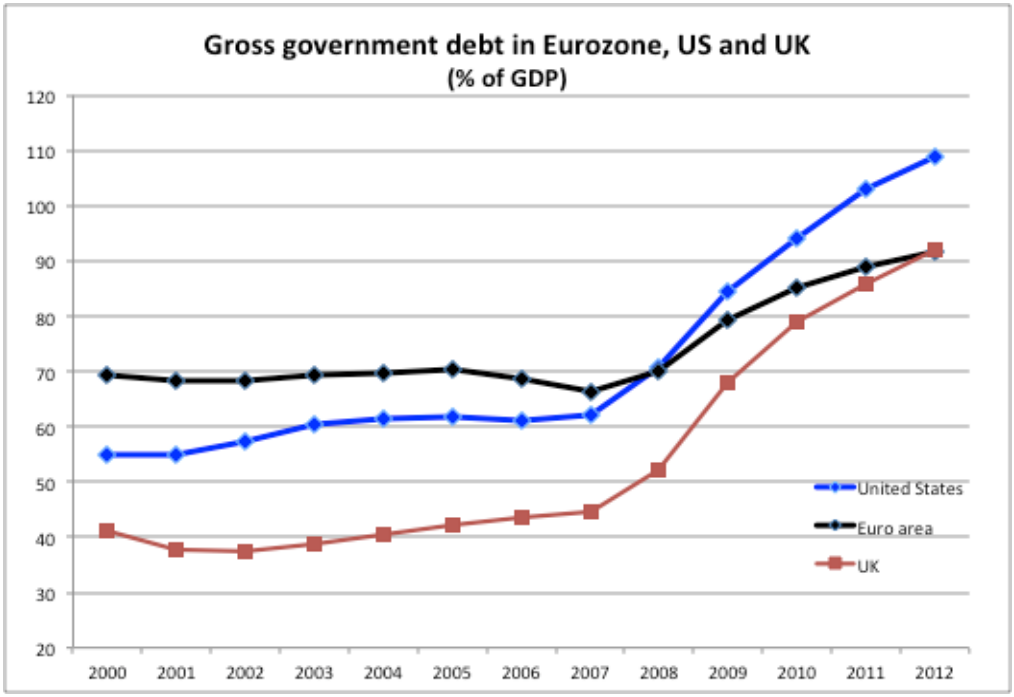


Source: European Commission, AMECO database and CEPS

It is now increasingly recognized that the explosion of the government debt ratios after 2008 is the result of a balance sheet recession that was triggered by the desire of the private sector to reduce its excessive debt, forcing governments to take over the private debt in order to avoid a debt deflation dynamics (Fisher(1936)). This dynamics was observed inside and outside the Eurozone. In fact it was probably stronger outside the Eurozone as suggested by Figure 2. Yet the new budgetary governance structure imposed on the Eurozone was completely impervious to this diagnosis and created disciplinary

institutions based on the diagnosis that the cause of the crisis was government indiscipline.

Figure 2. Gross government debt in Eurozone, US and UK



Source: European Commission, AMECO database

The new governance of the national budgetary processes is a source of surprise for another reason. At the start of the Eurozone a structural change in the nature of the debt of member countries of a monetary union occurred. It went almost unnoticed, however (see De Grauwe(2011)). This structural change arises from the fact that when countries joined the Eurozone the national governments had to issue debt in a currency over which they have no control. It is as if suddenly these governments had to issue debt in a foreign currency. This fundamentally changed the budget constraint of these governments. It is surprising that this fundamental change has played almost no role in the theoretical discussions of fiscal policies in a monetary union.

In the next section we discuss in more detail the nature of this structural change and we will argue that this change led to a weakening of the sovereigns in the Eurozone. This

has affected the nature fiscal policies in the Eurozone and instead of leading to too little in fact has led to too much budgetary discipline.

2. The fragility of the sovereigns in the Eurozone

When the Eurozone was started a fundamental stabilizing force that existed at the level of the member-states was taken away from these countries. This is the lender of last resort function of the central bank. Suddenly, member countries of the monetary union had to issue debt in a currency they had no control over. As a result, the governments of these countries could no longer guarantee that the cash would always be available to roll over the government debt. Prior to entry in the monetary union, these countries could, like all stand-alone countries, issue debt in their own currencies thereby giving an implicit guarantee that the cash would always be there to pay out bondholders at maturity. The reason is that as stand-alone countries they had the power to force the central bank to provide liquidity in times of crisis.

What was not understood when the Eurozone was designed is that this lack of guarantee provided by Eurozone governments in turn would have important destabilizing effects. First, it could trigger self-fulfilling liquidity crises (a sudden stop) that would degenerate into solvency problems. This is what happened in countries like Ireland, Spain and Portugal[1]. When investors lost confidence in these countries, they massively sold the government bonds of these countries, pushing interest rates to unsustainably high levels. In addition, the euros obtained from these sales were invested in "safe countries" like Germany. As a result, there was a massive outflow of liquidity from the problem countries, making it impossible for the governments of these countries to fund the rollover of their debt at reasonable interest rate.

A second effect of the fragility of the sovereign would arise from the first one. The liquidity crisis in turn would force countries to switch-off the automatic stabilizers in the budget. The governments of the problem countries had to scramble for cash and were

[1] Elsewhere we have argued that Greece does not fit this diagnosis. Greece was clearly insolvent way before the crisis started, but this was hidden to the outside world by a fraudulent policy of the Greek government of hiding the true nature of the Greek economic situation (see De Grauwe(2011)).

forced into instantaneous austerity programs, by cutting spending and raising taxes. A deep recession was the result. The recession in turn reduced government revenues even further, forcing these countries to intensify the austerity programs. Under pressure from the financial markets, fiscal policies became pro-cyclical pushing countries further into a deflationary cycle. As a result, what started as a liquidity crisis in a self-fulfilling way degenerated into a solvency crisis.

Thus, we found out that financial markets acquire great power in a monetary union: they can force countries into a bad equilibrium characterized by increasing interest rates that trigger intense austerity measures, which in turn lead to a deflationary spiral that aggravates the fiscal crisis. Countries pushed into such a bad equilibrium now face long periods of economic recession that will test the political and social acceptability of a monetary system that had been presented as heaven but is now perceived to be a hell for millions of people (see De Grauwe(2011)).

In the remainder of this paper we test the empirical validity of the two phenomena described in the previous paragraphs. First, we will analyse whether self-fulfilling crisis can erupt in the Eurozone. We will do this by analysing the behaviour of the long-term government bond rates in the Eurozone. We will also contrast this with the long-term government bond rates in the European Monetary System. Second, we will analyse the extent to which these movements in the long-term bond rates have triggered austerity programs, and in so doing have contributed to switching off the automatic stabilizers.

3. Testing the fragility hypothesis: Eurozone and EMS.

We can shed additional light on the fragility of the Eurozone by comparing the Eurozone with the European Monetary System (EMS)[2]. Prior to the Eurozone, the EMS that existed between 1979 and 1999 was a pegged exchange rate arrangement in which central banks promised to convert their liabilities into a foreign currency, the German mark, at a fixed price.

[2] In De Grauwe and Ji(2013) the Eurozone countries are compared to a sample of stand-alone industrialized countries during 1999-2012. This comparison leads to similar results as the ones that will be presented here.

The problem of this promise was that the central banks did not have these marks. As a result, when investors had doubts that the central bank may be unable to make this conversion because of a lack of marks, there would be a run on the central bank that in a self-fulfilling way would generate the crisis (i.e. an inability to make the conversion).

In the Eurozone national governments made a similar promise, i.e. to convert their liabilities (government bonds) into a "foreign" currency (the euro) i.e. a currency over which they had no control. This generated a similar fragility as in the EMS, which we analyzed in the previous section: when investors feared that the government would lack the euros to pay out at maturity there would be a run on the government, i.e. a sale of bonds that in a self-fulfilling way would generate the liquidity crisis that was so much feared (De Grauwe(2011)).

Thus, the difference between the EMS and the Eurozone is that the former was fragile because of a commitment in the foreign exchange market that lacked credibility while in the latter the fragility arose because of a lack of credibility of the commitments of the member state governments to convert their liabilities into euros.

As a test of our theory we will compare the spreads in the government bond markets in the two monetary regimes. We expect that in the EMS runs on the government bond markets do not occur (while they may occur in the foreign exchange markets[3]) because of the existence of liquidity backstops provided by the national central banks. In contrast, we expect runs on the government bond markets to occur in the Eurozone.

3.1 Data of long-term government bond markets

We study two samples of quarterly observations. The EMS-period is from 1981Q1 to 1993Q4, and the Eurozone period is from 2000Q1 to 2012Q2. The countries included in the EMS-period are Italy, Denmark, Belgium, Ireland, Austria, France and the Netherlands[4]. The countries included in the Eurozone are Greece, Portugal, Ireland, Spain, Italy, Belgium, France, Austria, the Netherlands and Finland[5].

[3] We analyzed these in De Grauwe and Ji(2013).

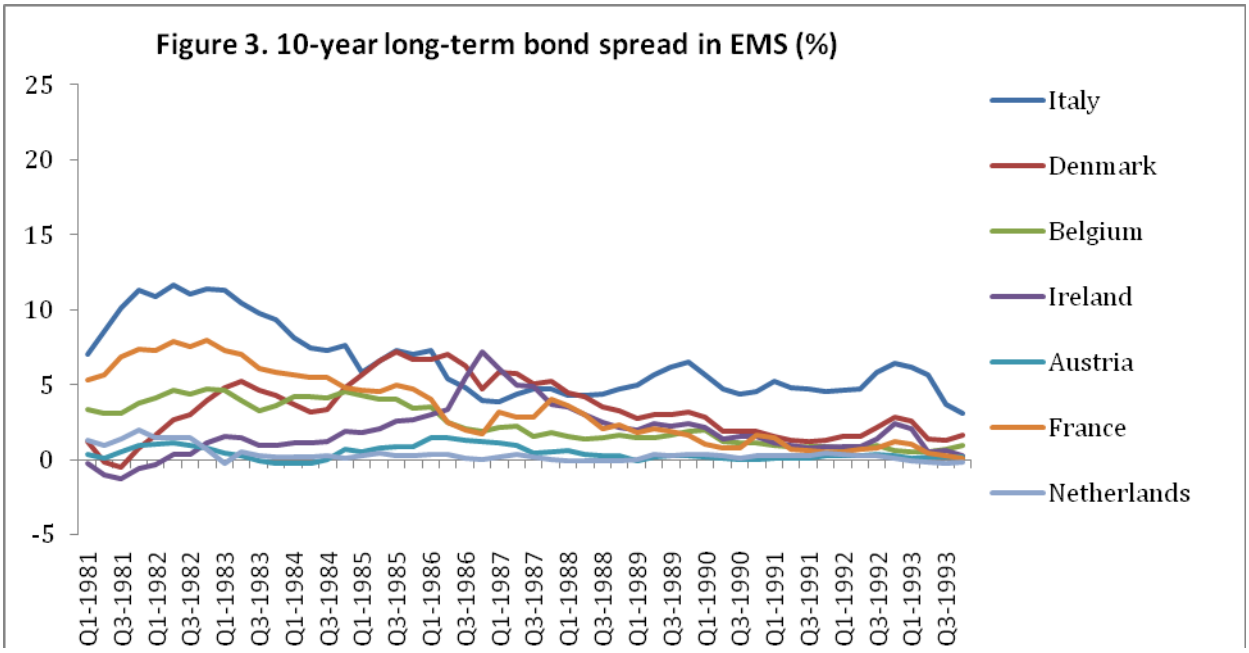
[4] UK, Portugal and Spain were in the EMS for a much shorter period, therefore they are not included in the EMS sample.

[5] Cyprus, Estonia, Luxemburg, Malta, Slovakia and Slovenia are not included in the Eurozone sample. The sizes of these economies are small and some of them have been in the Eurozone for quite short period.

We are interested foremost in the long-term government bond interest rates. We selected the 10-year government bond rates and we calculated the spreads. These are defined as the difference between the national and the German interest rates (considered to be the risk-free rate).

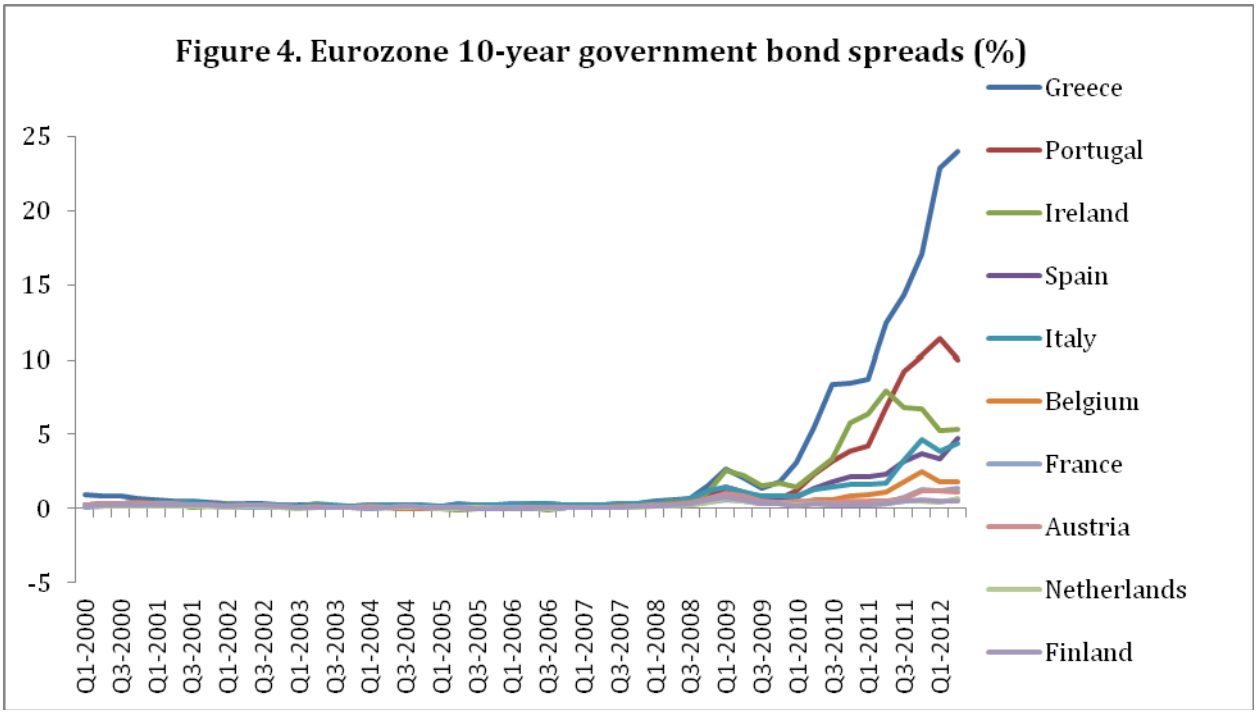
Figure 3 presents the long-term government bond spreads in the EMS and Figure 4 in the Eurozone. The contrast between the two is striking. In the EMS there were positive spreads throughout the period. These spreads move slowly, and as will be shown in the next section, are predictable by underlying fundamentals. In the Eurozone, we observe a period during which the spreads were practically zero and then from 2009 a sudden surge that as will be shown in the next section can only poorly be explained by fundamentals.

Figure 3. 10-year long-term bond spread in EMS (%)



Data source: Datastream (Oxford Economics)

Figure 4. Eurozone 10-year government bond spreads (%)



Data source: Datastream (Oxford Economics)

3.2 Econometric model

To analyze the determinants of the interest rate spreads in the EMS and the Eurozone. We specify the following fixed-effect econometric model.

$$S_{it} = \alpha + \delta * F_{it} + \alpha_i + u_{it} \qquad (1)$$

where S_{it} is the interest rate spread of country *i* in period *t*, α is the constant term and α_i is country *i*'s fixed effect. The latter variable measures the idiosyncrasies of a country that affect its spread and that are not time dependent. For example, the efficiency of the tax system, the quality of the governance, the population structure and many other variables that are country-specific are captured by the fixed effect. F_{it} is a set of fundamental variables that are specific to the two different monetary regimes. A fixed effect model helps to control for unobserved time-invariant variables and produces unbiased estimates of the "interested variables".

In the second step, following De Grauwe and Ji (2013), we introduce time dummies into the basic model and the specification is as follows:

$$S_{it} = \alpha + \beta * F_{it} + \alpha_i + \gamma_t + u_{it} \qquad (2)$$

where γ_t is the time dummy variable. This measures the time effects that are unrelated to the fundamentals of the model or (by definition) to the fixed effects. If significant, it shows that the spreads move in time unrelated to the fundamentals forces driving the yields. It will allow us to evaluate the importance of fundamental economic factors and time effects.

We first identify the fundamental variables that according to prevailing exchange rate theories affect the spreads in a fixed exchange rate system (the EMS). We then turn to the fundamentals model in a monetary union----the Eurozone.

Fundamentals determinants in fixed exchange rate system (EMS)

The oldest theory about the fundamental value of the exchange rate is the purchasing power parity theory. Although the empirical evidence for this theory remains surprisingly weak, especially as a theory describing the short and medium run behavior of the exchange rate, it has remained one of the fundamental cornerstones of the determination of the exchange rate (Obstfeld and Rogoff(2000)). In a nutshell it says that if a country experiences systematically more inflation than the country with which it pegs its currency, this country will have to devalue the currency to reflect this inflation differential. Rational agents who observe this systematic inflation differential will start anticipating the future devaluation. As a result the spread will be pushed up.

Modern theories of the exchange rate have expanded on the list of fundamental variables that affect the exchange rate. In these modern theories the exchange rate is a variable that will have to adjust so as to achieve external equilibrium (current account equilibrium), see Williamson(1985).

As fundamental variables we select the following quarterly data:

- The *inflation differential* between country i and Germany.
- The *current account* position of country i. When country i experiences systematic current account deficits these will have to be corrected. This can be achieved by

costly general expenditure reducing policies or by a devaluation. The risk that such a devaluation may occur will then affect the spread. This variable is calculated as the ratio between the accumulated current account since 1981Q1 and the GDP level of country i.

- The *real growth rate* of country i. Both the monetary theory of the exchange rate (see Sarno and Taylor(2002)) and the open economy macroeconomic models (Obstfeld and Rogoff(1996)) stress the importance of long term economic growth on the exchange rate. In general countries experiencing high growth rates will tend to have an appreciating currency, *ceteris paribus*. This effect is also akin to the Balassa-Samuelson effect.
- The *real effective exchange rate* (CPI based) as a measure of competitiveness. This variable can be seen as an early indicator of future current account imbalances.
- The *debt GDP ratio*: as there is a possible risk of default in the EMS, we selected the debt to GDP ratio as the variable that best measures this risk of future default (see next section where we discuss the importance if this fundamental variable as a measure of default risk)
- The *exchange rate change* (%): The EMS was characterized by frequent but relatively small realignments, especially in the first half of the period. These frequent realignments are likely to affect expectations of future realignments. This variable aims to measure the importance of this effect.

Fundamentals determinants in monetary union (Eurozone)

The set of economic and monetary variables F_{it} include the most common fundamental variables found in the *sovereign bond* literature [6] are: variables measuring the

[6] Attinasi, M., et al. (2009), Arghyrou and Kontonikas(2010), Gerlach, et al.(2010), Schuknecht, et al.(2010), Caceres, et al.(2010), Caporale, and Girardi (2011), Gibson, et al. (2011), De Grauwe and Ji (2013), Aizenman and Hutchinson(2012), Beirne and Fratzscher(2012). There is of course a vast literature on the spreads in the government bond markets in general. See for example the classic Eaton, Gersovitz and Stiglitz(1986) and Eichengreen and Mody(2000). Much of this literature has been influenced by the debt problems of emerging economies. See for example, Edwards(1984), Edwards(1986) and Min(1998).

sustainability of government debt. We will use the debt to GDP ratio. In addition, we use the current account position, the real effective exchange rate and the rate of economic growth as fundamental variables affecting the spreads. The effects of these fundamental variables on the spreads can be described as follows.

- When the *government debt to GDP ratio* increases the burden of the debt service increases leading to an increasing probability of default. This then in turn leads to an increase in the spread, which is a risk premium investors demand to compensate them for the increased default risk. We also add debt to GDP ratio squared. The reason of focusing on the non-linear relationship comes from the fact that every decision to default is a discontinuous one, and leads to high potential losses. Thus, as the debt to GDP ratio increases, investors realize that they come closer to the default decision, making them more sensitive to a given increase in the debt to GDP ratio (Giavazzi and Pagano(1990)).
- The *current account* has a similar effect on the spreads. Current account deficits should be interpreted as increases in the net foreign debt of the country as a whole (private and official residents). This is also likely to increase the default risk of the government for the following reason. If the increase in net foreign debt arises from the private sector's overspending it will lead to default risk of the private sector. However, the government is likely to be affected because such defaults lead to a negative effect on economic activity, inducing a decline in government revenues and an increase in government budget deficits. If the increase in net foreign indebtedness arises from government overspending, it directly increases the government's debt service, and thus the default risk. To capture net foreign debt position of a country, we use the accumulated current account GDP ratio of that country. It is computed as the current account accumulated since 2000Q1 divided by its GDP level.
- The *real effective exchange rate* as a measure of competitiveness can be considered as an early warning variable indicating that a country that experiences a real appreciation will run into problems of competitiveness which in turn will lead to future current account deficits, and future debt problems. Investors may then demand an additional risk premium.

- *Economic growth* affects the ease with which a government is capable of servicing its debt. The lower the growth rate the more difficult it is to raise tax revenues. As a result a decline of economic growth will increase the incentive of the government to default, raising the default risk and the spread.

3. 3 Econometric results

Long-term government bond spreads: EMS

We start with the econometric analysis of the long-term government bond spreads in the EMS. A Hausman test confirms that a fixed effect model is more appropriate than a random effect model. The results are shown in Table 1. It is likely that there is a structural break in the EMS period due to the fact that European countries decided to give up capital controls and free the capital movement across Europe around 1987. A Chow test confirms this view and therefore we also run separate regressions on the pre-1987 and post-1987 periods in Table 1. The results suggest that during the pre-1987 period, the debt to GDP ratio, the current account position and changes in exchange rate are significant variables associated with the spread; during the post-1987 period, the inflation differential becomes a significant variable.

Were the long-term government bond markets in the EMS exposed to time-dependent market sentiment? To test this, we perform an F test of the time dummies and the result is also shown in Table 1. The hypothesis that there is no time effect cannot be rejected. This test is illuminating and is consistent with our theory. In the EMS, each government issued debt in its own currency and was fully backed by the lender of last resort guarantee in the government bond markets. This guarantee prevented market fears of imminent defaults from destabilizing the national bond markets. Although the spreads were substantial they can be related to underlying fundamentals (such as exchange rate changes, inflation differentials, the current account positions). Note that this occurred while there were frequent speculative crises in the foreign exchange markets.

Table 1. Long-term government bond spread in EMS period

	(1) Pooled	(2) Pre-1987	(3) Post-1987
Debt/GDP ratio	0.0292	0.0834*	0.0415***
	[0.0252]	[0.0370]	[0.0077]
Accumulated current account/GDP ratio	-0.0853	-0.2330***	-0.0337
	[0.0482]	[0.0478]	[0.0384]
Real effective exchange rate	-0.0128	0.0180	0.0467*
	[0.0478]	[0.0714]	[0.0191]
Growth rate	0.0991	0.0365	0.0017
	[0.0665]	[0.1178]	[0.0341]
Inflation differences	0.2431	0.2213	0.3086***
	[0.1754]	[0.1718]	[0.0780]
Change in exchange rate	0.2448*	0.2787***	0.1326***
	[0.1165]	[0.0479]	[0.0339]
Observations	364	168	196
R^2	0.6974	0.8226	0.8748
Hausman test for fixed effect model		Prob>chi2 = 0.0000	
Chow test for structural break		Prob > F = 0.0000	
Time fixed effect F test		Prob > F=0.4808	

Cluster at country level and robust standard error is shown in brackets. * p < 0.1, ** p < 0.05, *** p < 0.01

Long-term government bond spreads: Eurozone

To compare the long-term government bond spreads in the Eurozone with those in the EMS, we again run regressions using a fixed effect model. After having established by a Hausman test that the random effect model is inappropriate, we used a fixed effect model to analyze the long-term bond spreads in the Eurozone. Table 2 presents regressions of the Eurozone countries using the proposed fixed effect model. Column (1) shows the regression without the time dummies using the pooled sample. The debt to GDP ratio is a significant variable and the relationship between the spread and the debt to GDP ratio is non-linear[7]. Additionally, we find that the growth rate is negatively associated with the spread.

Figure 4 suggests that a structural break occurs at the time of the financial crisis. A Chow test revealed that a structural break occurred in the Eurozone around the year 2008. This allows us to treat the pre- and post-crisis periods as separate and we show the results in Table 2(2) and (3). In general, the results confirm that since 2008 the markets become

[7] We could not find such a non-linearity in the EMS

more cautious towards some key economic fundamentals, which are associated with higher spreads. To be specific, the coefficients of the debt to GDP ratio and accumulated current account GDP ratio are low and insignificant prior to the crisis. In the post-crisis period these coefficients become larger and are statistically significant[8]. Moreover, the coefficient of the real effective exchange rate is negative prior to the crisis and this negative effect does not last any more.

Table 2. Long-term government bond spreads of Eurozone

	(1) Pooled	(2) Pre-crisis	(3) Post-crisis	(4) FT model
Debt/GDP ratio	-0.0901***	-0.0114	-0.0892**	-0.0968**
	[0.0254]	[0.0066]	[0.0387]	[0.0379]
Debt/GDP ratio squared	0.0011***	0.0001	0.0008**	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
Real effective exchange rate	-0.0185	-0.0149***	-0.2156	0.0293
	[0.0466]	[0.0024]	[0.2331]	[0.0361]
Growth rate	-0.1070*	-0.0008	-0.1145	-0.2058**
	[0.0511]	[0.0037]	[0.0853]	[0.0873]
Accumulated current account/GDP ratio	-0.0192	0.0003	-0.1845*	-0.0301
	[0.0122]	[0.0016]	[0.0834]	[0.0186]
Observations	500	320	180	500
R^2	0.7193	0.7088	0.8297	0.8724
Hausman test	Prob>chi2 =0.0000			
Chow test	Prob > F = 0.0000			
Time fixed effect F test	Prob > F=0, "no time effect" hypothesis is rejected			

Cluster at country level and robust standard error is shown in brackets. * p < 0.1, ** p < 0.05, *** p < 0.01

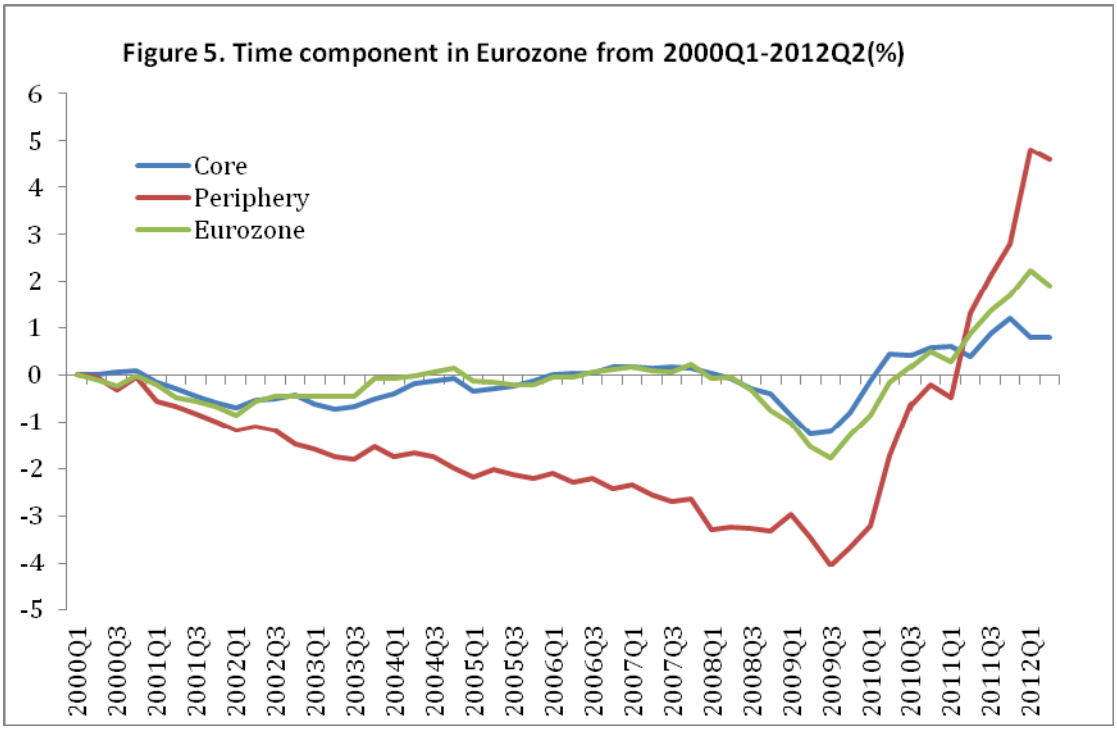
Finally, the results of the time dummy model are shown in Table 2(4). An F test confirms that there are significant time components in the regression. In order to differentiate the core (Austria, Belgium, France, Finland, the Netherlands and Italy) and periphery (Spain, Ireland, Portugal and Greece) Eurozone groups, we assume that the time components of the two groups can be different. We show the estimated time components (associated with the regression results in Table 2(4)) in Figure 5. It confirms the existence of significant time components that led to deviations of the spreads from the

[8] Similar results are obtained by Schuknecht et al. (2010), Arghyrou and Kontonikas(2010), Borgy, et al., (2011), Gibson, et al. (2011), Beirne and Fratzscher(2012) and Ghosh and Ostry(2012)

underlying fundamentals. This time effect is especially pronounced in the peripheral countries. This result in the Eurozone contrasts a great deal with the one in the EMS. In the EMS, there is always a national bank acting as a liquidity backstop in the government bond market, while in the Eurozone where the absence of a credible backstop leads to scenarios in which the government bond markets can be gripped by market fear and panic. This leads to large spreads that cannot be justified by the economic fundamentals.

Another noticeable result is the dynamics of the time dummies. Prior to the crisis we observe increasing negative time dummies in the periphery countries. The time component of the periphery Eurozone countries was negative and declining until 2009Q3 and when the crisis erupts there is a quick increase of the time dummies and these become significantly positive and hit 4.79% in 2012. This result suggests that prior to the crisis the fundamentals increasingly pointed towards the need to increase the spreads. Financial markets however, did not recognize this, until market sentiments abruptly changed. These market sentiments then overreacted and produced spreads that far exceeded those predicted by the deteriorating fundamentals. Thus in a way it can be said that the markets were wrong much of the time. Prior to the crisis they disregarded the deteriorating fundamentals in the periphery when pricing the government bonds. After the crisis they overreacted and applied spreads that were too high when compared to the underlying fundamentals.

Figure 5. Time component in Eurozone form 2000Q1-2012Q2 (%)



Source: authors' own calculations from regressions in Table 2(4).

Thus, there is a contrast between the Eurozone and the EMS. In the former, the absence of a lender of last resort in the government bond markets led to a dynamics in which the spreads could be driven away from their fundamentals. We do not observe such a phenomenon in the EMS. Our interpretation is that this was due to the existence of a liquidity backstop in the government bond markets of the member countries of the EMS.

We have focused in this section on the long-term government bond rates in two different monetary regimes, the EMS and the Eurozone. In De Grauwe and Ji(2013) the different behavior of the money market rates in these two regimes is also analyzed. We find the opposite pattern in the money markets. In the Eurozone the money market spreads remain practically zero throughout the period owing to the fact that the ECB was a credible backstop in these markets. In contrast, the money market spreads in the EMS were very volatile owing to its close link with the foreign exchange markets. An econometric analysis of these spreads reveals that during speculative crises these are subject to surges that cannot be explained by the underlying fundamentals. The

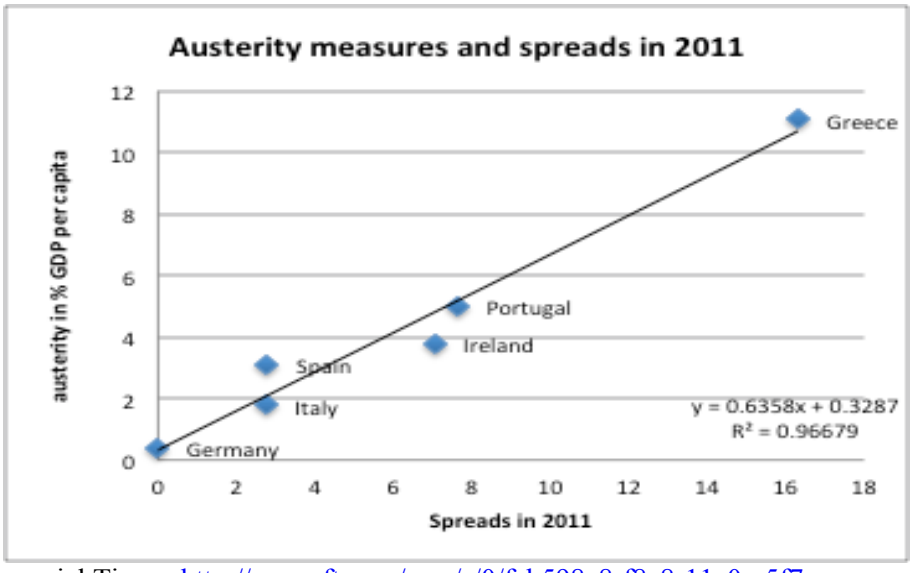
interesting aspect of this result is that during speculative crises the government bond spreads of the countries under speculative pressure remained relatively stable.

4. From liquidity crises to forced austerity

In the previous section we provided evidence that the fragility of the sovereigns in the Eurozone can lead to runs on the government bond markets. These runs lead to increases in the spreads and a sudden stop in liquidity provision. As argued in the first section this then can lead countries into intense austerity programs. In this section we provide evidence showing that this effect indeed has been significant.

We present some evidence in Figure 6. This shows the average interest rate spreads[9] in 2011 on the horizontal axis and the intensity of austerity measures introduced during 2011 as measured by the Financial Times[10] (as a percent of per capita GDP). This measure of austerity is constructed in the tradition of the "narrative approach" as pioneered by Romer and Romer(2010). It aims at producing exogenous measures of fiscal policy stance.

Figure 6. Austerity measures and spreads in 2011.



Source: Financial Times, http://www.ft.com/cms/s/0/feb598a8-f8e8-11e0-a5f7-00144feab49a.html#axzz2JSOwncys and Datastream

[9] These are defined as the difference between each country's 10-year government bond rate and the German 10-year government bond rate

[10] Financial Times, http://www.ft.com/cms/s/0/feb598a8-f8e8-11e0-a5f7-00144feab49a.html#axzz2JSOwncys

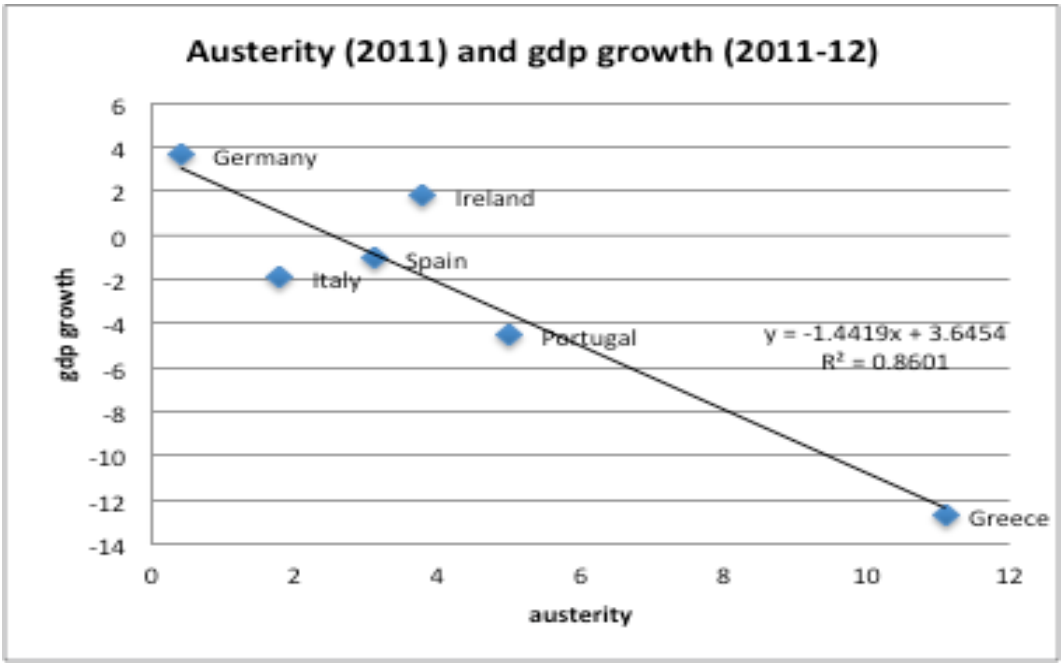
It is striking to find a very strong positive correlation between the spreads in and the austerity measures in 2011 (the R^2 = 0.97). Note the two extremes. Greece was confronted with extremely high spreads in 2011 and applied the most severe austerity measures amounting to more than 10% of GDP per capita. Germany that did not face any pressure from spreads did not do any austerity.

Thus, financial markets exerted different degrees of pressure on countries. By raising the spreads they forced some countries to engage in severe austerity programs. Other countries did not experience increases in spreads and as a result did not feel much urge to apply the austerity medicine.

We can now give the following interpretation of how the spreads exerted their influence on policymakers and led them to apply severe austerity measures. As the spreads increased due to market panic, these increases also gripped policy makers. Panic in the financial markets led to panic in the world of policymakers in Europe. As a result of this panic, rapid and intense austerity measures were imposed on countries experiencing these increases in spreads. The imposition of dramatic austerity measures was also forced by the fact that countries with high spreads were pushed into a liquidity crisis by the same market forces that produced the high spreads (De Grauwe(2011)). This forced these countries to beg "hat in hand" for funding from the creditor countries.

How well did this panic-induced austerity work? We provide some answers in Figures 7 and 8. Figure 7 shows the relation between the austerity measures introduced in 2011 and the growth of GDP over 2011-12. We find a strong negative correlation. Countries that imposed the strongest austerity measures also experienced the strongest declines in their GDP. This result is in line with the IMF's recent analysis (IMF(2012)).

Figure 7. Austerity (2011) and GDP growth (2011-12)

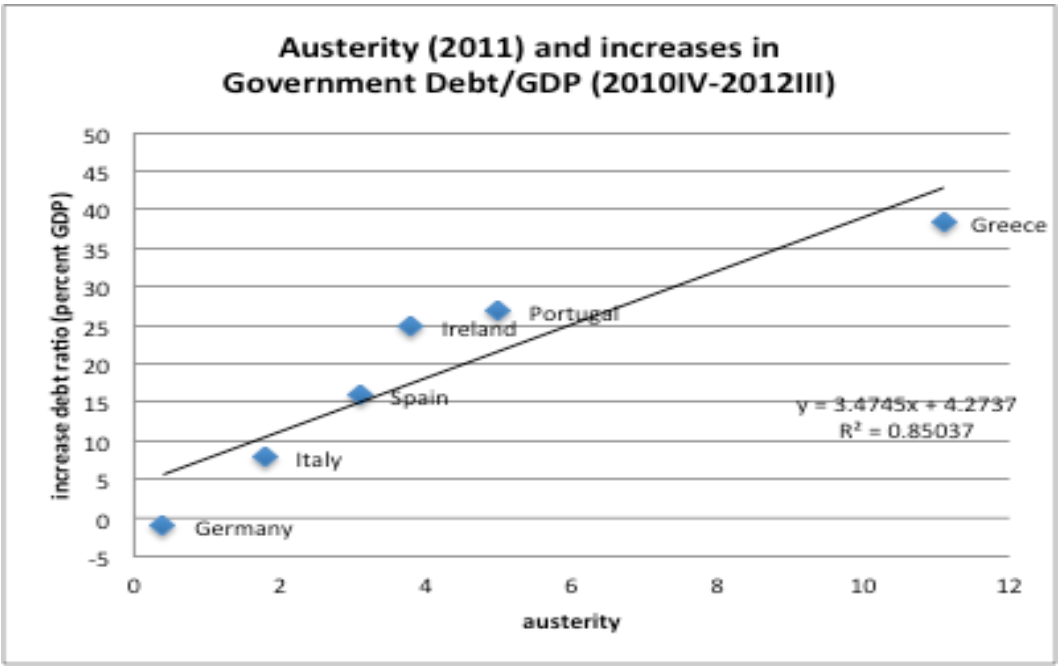


Source: Financial Times, http://www.ft.com/cms/s/0/feb598a8-f8e8-11e0-a5f7-00144feab49a.html#axzz2JSOwncys and Datastream

Some will say that this is the price that has to be paid for restoring budgetary orthodoxy. But is this so? Figure 8 may lead us to doubt about this. It shows the austerity measures and the subsequent change in the debt to GDP ratios[11]. It is striking to find a strong positive correlation. The more intense the austerity, the larger is the subsequent increase in the debt to GDP ratios. This is not really surprising, as we have learned from the previous figure, that those countries that applied the strongest austerity also saw their GDP (the denominator in the debt ratio) decline most forcefully. Thus, it can be concluded that the sharp austerity measures that were imposed by market and policy-makers' panic not only produced deep recessions in the countries that were exposed to the medicine, but also that up to now this medicine did not work. In fact it led to even higher debt to GDP ratios, and undermined the capacity of these countries to continue to service the debt. Thus the liquidity crisis that started all this, risks degenerating into a solvency crisis.

[11] In Greece there was a debt restructuring at the end of 2011 which reduced the Greek government's debt by about 30% of GDP. We do not take this into account in the Greek numbers as we want to measure the total effect of austerity on the government debt ratios.

Figure 8. Austerity (2011) and increases in government debt/GDP (2010V-2012III)



Source: Financial Times, http://www.ft.com/cms/s/0/feb598a8-f8e8-11e0-a5f7-00144feab49a.html#axzz2JSOwncys and Datastream

Note: The Greek government/debt ratio excludes the debt restructuring of end 2011 that amounted to about 30% of GDP

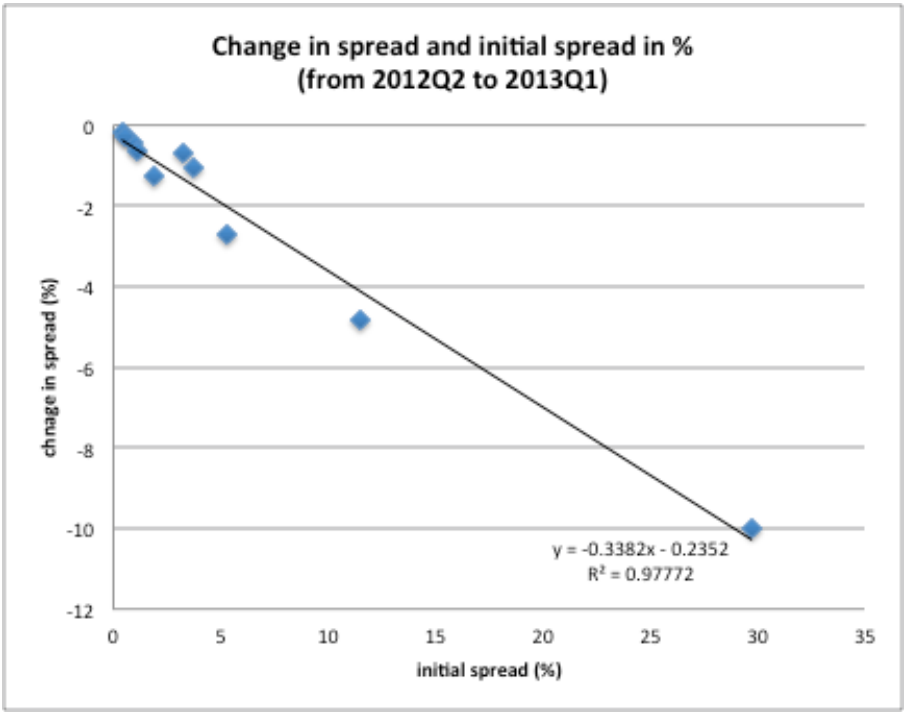
5. The role of central bank

The decision by the ECB in 2012 to commit itself to unlimited support of the government bond markets was a game changer in the Eurozone. It was called "Outright Monetary Transactions" (OMT). It had dramatic effects. By taking away the intense existential fears that the collapse of the Eurozone was imminent the ECB's lender of last resort commitment pacified government bond markets and led to a strong decline in the spreads of the Eurozone countries.

This decision of the ECB provides us with an interesting experiment to provide additional evidence about how the spreads are formed. In section 2 we provided evidence that the spreads can be driven away from underlying fundamentals when markets are gripped by fear and panic. The announcement by the ECB had dramatic effects on the spreads. We show this in Figure 9. On the vertical axis we show the change in the spreads in the Eurozone from the middle of 2012 (when the ECB announced its OMT program) to

the beginning of 2013. On the horizontal axis we present the initial spread, i.e. the one prevailing in the middle of 2012. We find a surprising phenomenon. The initial spread (i.e. in 2012Q2) explains almost all the subsequent variation in the spreads. Thus the country with the largest initial spread (Greece) experienced the largest subsequent decline; the country with the second largest initial spread (Portugal) experienced the second largest subsequent decline, etc. In fact the points lie almost exactly on a straight line going through the origin. The regression equation indicates that 97% of the variation in the spreads is accounted for by the initial spread. Thus it appears that the only variable that matters to explain the size of the decline in the spreads since the ECB announced its determination to be the lender of last resort (OMT) is the initial level of the spread. Countries whose spread had climbed the most prior to the ECB announcement experienced the strongest decline in their spreads.

Figure 9. Change in spread and initial spread in % (from 2012Q2 to 2013Q1)

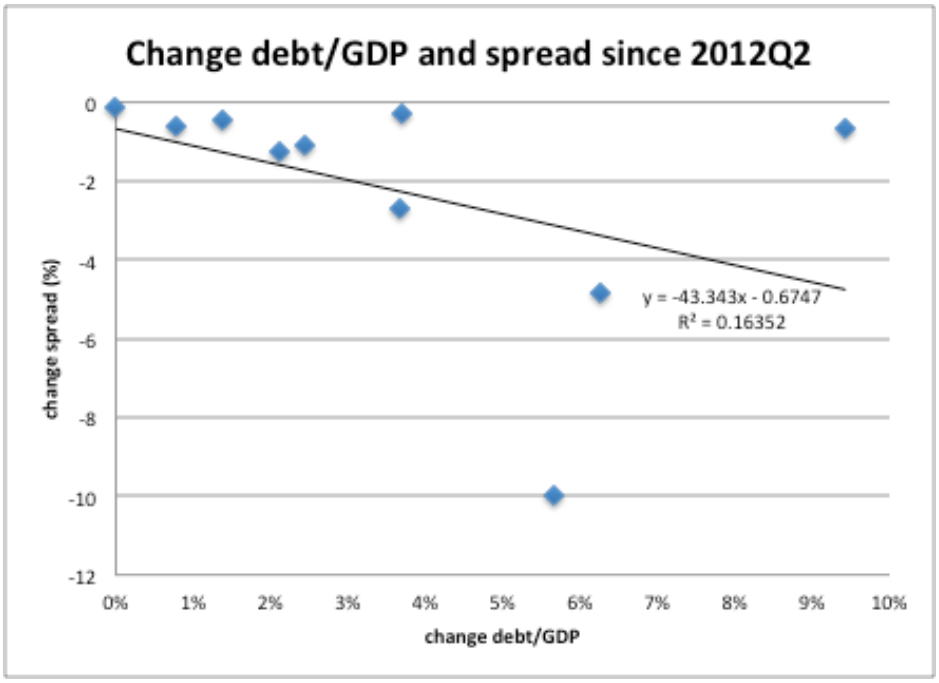


Source: Datastream (Oxford Economics)

What about the role of fundamentals in explaining the decline in the spreads observed since the middle of 2012? In Figure 10 we provide some evidence. We selected the

change in the government debt/GDP as the fundamental variable. It appears from many studies (Aizenman and Hutchinson(2012), Attinasi, et al., (2009), Beirne and Fratscher(2012), De Grauwe and Ji(2012)), that the debt/GDP ratio is the most important fundamental variable influencing the spreads. We observe two interesting phenomena in Figure 10. First while the spreads declined, the debt/GDP ratio continued to increase in all countries after the ECB announcement. Second, the change in the debt/GDP ratio is a poor predictor of the declines in the spreads (as can be seen from the regression equation). Thus the decline in the spreads observed since the ECB announcement appears to be largely unrelated to the changes of the debt to GDP ratios. If anything, the fundamentalist school of thinking would have predicted that as the debt to GDP ratios increased in all countries, spreads should have increased rather than decline. It is clear to us that the bad economic fundamentals are not the right diagnosis of the debt crisis.

Figure 10. Change debt/GDP and spread since 2012Q2



Source: Datastream (Oxford Economics)

From the previous discussions one can conclude that a large component of the movements of the spreads since 2010 was driven by market sentiments. These market sentiments of fear and panic first drove the spreads away from their fundamentals. Later

as the market sentiments improved thanks to the announcement of the ECB, these spreads declined spectacularly.

We can now give the following interpretation of how the spreads exerted their influence on policymakers and led them to apply severe austerity measures. As the spreads increased due to market panic, these increases also gripped policy makers. Panic in the financial markets led to panic in the world of policymakers in Europe. As a result of this panic, rapid and intense austerity measures were imposed on countries experiencing these increases in spreads. Instead of being a machinery of budgetary indiscipline, the Eurozone became a vehicle imposing excessive discipline on member countries. This had all to do with the fact that the member countries governments' were structurally weakened in that they lost their natural ally, the local central bank as a lender of last resort.

6. Conclusion

The nature of fiscal policies was changed dramatically by the creation of the Eurozone. While prior to the start of the Eurozone, national governments were sovereign in that they could back up the issue of debt by the issue of money, they lost this sovereignty in the Eurozone. This had dramatic effects that were largely overlooked by the designers of the Eurozone.

First, this structural change made the sovereigns vulnerable to self-fulfilling liquidity crises that could push these governments into insolvency. Thus, financial markets acquired great power over the sovereigns in that they could force them into default. Before entering the Eurozone these same sovereigns could not be forced into default by financial markets because they possessed an ultimate liquidity backstop. In a sense it can be said that the member countries of the Eurozone were downgraded to emerging countries that lack the capacity to issue debt in their own currencies and that face the same vulnerability.

Only in 2012, three years after the start of the sovereign debt crises in the Eurozone, did the ECB accept a role of lender of last resort in the government bond

markets in the context of its OMT program. This had an immediate stabilizing effect and led to rapid declines in the government bond spreads that we illustrated in this paper. Thus, the power of the ECB to counter market sentiments of fear and panic is great. This is good news for the future of the Eurozone. However, up to now the power of the ECB has been exerted only by announcement. It is clear that if market sentiments were to turn around again, the ECB would be forced to intervene. Intervention will be necessary if the ECB wants to avoid losing its credibility and its power.

A second implication of the loss of monetary sovereignty by national governments was that these governments were forced to switch off the automatic stabilizers in the budget when pressured by financial markets. This feature became prominent after 2009 when, as we argued in this paper, financial markets forced intense austerity in the countries of the periphery. Thus by entering the Eurozone, member countries lost much of their capacity to use fiscal policies as a stabilizing instrument when they needed it most. Thus, in contrast to what was many economists expected, i.e. that in a monetary union fiscal discipline is loosened, necessitating special disciplinary devices, the opposite occurred. By taking away from sovereigns their power to create money, a strong disciplinary force is exerted on these sovereigns. We have argued that this fiscal discipline has been excessive since the start of the sovereign debt crisis.

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Discussion

George Hondroyiannis
Bank of Greece and Harokopio University

1. Introduction

I am very pleased to participate in this conference and discuss this paper by Paul De Grauwe and Yuemei Ji. This is clearly a very interesting and timely paper and I am sure it will initiate new discussions in this area of research. The developments in the euro area sovereign bond markets have received considerable attention by policy makers since 2009. Starting from the literature on the determinants of sovereign bond yields, the paper addresses the following three questions: a) to what extent have spreads in sovereign bond yields been driven by fundamentals in the context of EMU, b) how does this compare to the experience under EMS and c) how relevant is fiscal tightening as a response to the current sovereign debt crisis? It is clear that different answers to the previous questions would lead policy makers to different policy actions. For instance, if sovereign bond yields are determined by fundamentals and mainly by fiscal variables, then fiscal consolidation would be an appropriate reaction in countries under financial stress.

2. Empirical approach and main findings

The empirical relevance of fundaments in explaining the interest rate spread of 10-year sovereign bonds vis a vis the Bund is assessed via the following model:

$$S_{it} = a + \delta F_{it} + \alpha_i + \gamma_t + u_{it} \quad (1)$$

where S_{it} is the spread in country i, α_i are fixed effects, γ_t contains period dummies and F_{it} is a vector of fundamentals, including debt/GDP, (debt/GDP)^2, real effective exchange rate, real GDP growth rate, the inflation differential vis a vis Germany, accumulated current account balances as a ratio of GDP and percentage change

of the exchange rate. The data are quarterly and cover two periods: a) the EMS period (1981q1-1993q4) for IT, DK, BE, IE, AT, FR, NL and b) the EMU period (2000q1-2012q2) for GR, PT, IE, ES, IT, BE, FR, AT, NL, FI. The main findings are that in the context of EMS: a) there is no evidence of time-dependent market sentiment (proxied by the period dummies) and b) despite exchange rate speculation, bond spreads remained linked to fundamentals, as governments maintained control over their national currency. On the contrary, in the context of EMU the main findings are that: a) period effects are significant, leading to departures from fundamentals (especially in the periphery), b) pre-crisis, sovereign risks were underpriced, c) post-crisis, the absence of a liquidity backstop (lender of last resort) led to overreaction and d) the ECB announcement of OMT had an immediate stabilizing effect.

The authors complement their econometric analysis with stylized facts underpinning the ineffectiveness of austerity measures in reducing spreads, to arrive at the following conclusions: a) EMU membership has changed fundamentally Members' budget constraint, rendering sovereigns vulnerable to self-fulfilling liquidity crises, b) the ECB accepting the role of lender of last resort in the context of the OMT programme has been a game changer, c) austerity measures appear to have had little relevance in restoring market confidence and d) in undermining the social responsibilities of national governments, fiscal tightening threatens their legitimacy.

The paper makes the case that the fiscal crisis that erupted after 2008 cannot be attributed to government profligacy prior to 2008. As a consequence, the tightening of control mechanisms on national fiscal policies is criticized to be knocking at the wrong door. Greece is clearly noted to be the odd one out in this diagnosis. To the extent that statistical window-dressing concealed the true extent of fiscal profligacy in Greece, one might argue that pricing away from fundamentals may in part reflect reputation effects. It would be interesting to include some indication of the robustness of estimates to the Greek outlier.

The inclusion of general government debt accounts for public debt held by both, domestic and foreign agents. The inclusion of the accumulated current account controls for public and private debt held by foreign agents. Including a measure of private debt

held by domestic agents would additionally capture sovereign risks stemming from domestic banks' exposure to domestic risks (e.g. mortgage NPLs), thus completing the feedback loop between economic activity, financial sector balance sheets and sovereign credit risk.

In this type of analysis endogeneity can be an important concern. Apart from measurement error and/or omitted variables issues, simultaneity is likely to be a primary concern, as the relationship between spreads and macroeconomic fundamentals may work both ways. It would be useful to be more explicit on the extent to which the estimation methods employed account for possible endogeneity issues (e.g. GMM, 2SLS).

Non-linearity in debt is an important feature of the estimated relationship for the EMU, suggesting an intuitive convexity. However, the estimated minimum at 69% of GDP appears to be at odds with the experience of Spain. Spanish debt remained below the 69% threshold until end-2011. However, between 2009q4 and 2011q4 the Spanish spread increased by more than 6-fold (Figure 4). During the same period, real GDP growth averaged +0.5% and according to Figure 5, the time component in the periphery remained negative until 2011q2. Given that the only significant coefficients in the FT model are those on debt, $debt^2$ and GDP growth, it seems that the estimated relation falls short of being representative of Spain, casting doubts on the common parameter assumption embedded in the panel regression.

Most studies in this area of research include the fiscal deficit as a regressor, as it conveys information on debt flows and the fiscal stance. Concentrating solely on the stock of debt is likely to ignore an important component of the underlying fundamentals. Finally, many studies include a lagged dependent variable, permitting an estimate of spreads' persistence. This is of particular interest to policy makers, as it can have important implications for the conduct of fiscal - and hence also monetary - policy in the euro area. For example, high persistence in periods of high spreads implies considerably higher government borrowing requirements. Based on daily and monthly data, Attinasi *et al* (2009) report strong significance of lagged spreads with coefficient close to unity while Hondroyiannis, Kelejian and Tavlas (2010) controlling for contagion report relatively low persistence.

4. The contagion effect

The paper does not address the following questions: Are government bond yield spreads in euro area contagious? Does the observed widening in euro area spreads reflect investors' beliefs that countries with similar fiscal positions will fail to improve their public finances quickly enough? If some form of contagion is found to be a source of pressure on sovereigns, then coordinated policy responses could play an important role.

To explore the above questions we follow Kelejian, Tavlas and Hondroyiannis (2006), Hondroyiannis, Kelejian and Tavlas (2009, 2010) and Hondroyiannis, Kelejian, Purba and Tavlas (2013). Contagion is defined not as a simple correlation or as interrelationship between the government bond spreads of one country to the other, but as something deeper which is affecting the fundamentals. If contagion is present, the effects of the determinants in any given country are channelled through to other countries. As such, the effects of contagion and of the determinants become intertwined.

A spatial modeling approach is used to specify and test for contagion among euro area countries' government bond spreads. This approach enables us to estimate asymmetries such as the magnitude of contagion of one country upon others, as well as how that country in turn is affected by events in neighboring countries. The approach also enables us to test for contagion, and to estimate its extent, in a formal, straightforward way.

Specifically, the following model is used (see Hondroyiannis, Kelejian and Tavlas 2010)

$$spread_{it} = a_0 + \delta_i + \beta_1(spread_{it-1}) + \beta_2(dliqn_{it}) + \beta_3(cd_{it}) + \beta_4(drate_{it}) + \beta_5(volatility_{it}) + \beta_6(contagion_{it}) + \varepsilon_{it} \qquad (2)$$

The dependent variable, $spread_{it}$, is the ten-year government bond yield spread of country *i* relative to Germany at time *t* which is used as lagged dependent variable to capture persistence, while δ_i are fixed effects,. The next four regressors $dliqn_{it}$, cd_{it},

$drate_{it}$ and $volatility_{it}$ are the determinants of the countries considered[12]. The first variable $dliqn_{it}$ is a proxy for the degree of liquidity, cd_{it} is a measure of credit risk, proxied by country i's CDS, $drate_{it}$ is the change in the credit rating and $volatility_{it}$ measures stock market volatility. The contagion variable is defined as $contagion_{it} = \sum_{j=1; j\neq i}^{9} w_{ij,t} spread_{jt}$ where $w_{ij,t}$ is an element of a weighting matrix which describes the inverse fiscal position of a country relatively to its GDP at time *t*. The data are weakly and cover the period from March 2003 to February 2010 for nine euro area countries (Austria, Belgium, Finland, France, Greece, Italy, the Netherlands, Portugal and Spain). The empirical results are presented in Table 1 and imply that: a) contagion is a significant factor in influencing ten-year government bond yield spreads, b) its effects are not uniform across the countries considered, c) the channels of transmission relate to the differences in the fiscal positions of the country, d) contagion spill-overs are most pronounced between countries that have similar fiscal positions, e) the significant determinants involved in inducing contagion are liquidity risk, default risk, downgrade risk and stock market volatility and f) the existence of significant persistence which is asymmetric across countries in the euro area.

5. Conclusion

The extent to which spreads are driven by fundamentals remains a pending issue in the relevant literature. Although most studies agree that there is a link between the country's fiscal position and the level of spread, the degree of this interaction varies. In addition, contagion could play an important role determining the size of spreads. Our results suggest that contagion is a statistically significant factor in explaining the level of government bond spreads and, furthermore, its effects are not uniform across the countries considered. In addition, the empirical results of the dynamic model we used point to the existence of significant persistence which is asymmetric across countries in euro area.

[12] For more details see Hondroyiannis Kelejian and Tavlas (2010).

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Table 1 **Model Estimation**	
Variables	Model 1
Constant	-12.323* (-1.59)
$spread_{it-1}$	0.716** (12.82)
$liqn_{it}$	0.408* (1.82)
cd_{it}	0.233** (5.80)
$drate_{it}$	222.94*** (4.34)
$volatility_{it}$	937.24*** (5.70)
$contagion_{it}$	0.059** (2.23)
S.E. of regression	7.45
Notes: t-statistics are given in parenthesis. ***, ** indicates statistical significance at the 1% level and 5% level respectively. The results are taken from Table 1 of Hondroyiannis, Kelejian and Tavlas (2010).	

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