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Mispricing of Sovereign Risk and Macroeconomic Stability in the Eurozone*

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Abstract

This article presents evidence that a significant part of the surge in the spreads of the PIIGS (Portugal, Ireland, Italy, Greece and Spain) countries in the eurozone during 2010–11 was disconnected from underlying increases in the debt-to-GDP (gross domestic product) ratios, and was the result of negative market sentiments that became very strong since the end of 2010. It is argued that the systematic mispricing of sovereign risk in the eurozone intensifies macroeconomic instability, leading to bubbles in good years and excessive austerity in bad years.

Introduction

The sudden emergence of the government debt crisis since 2009 poses serious problems for the survival of the eurozone. The common theory about the spreads in the government bond rates in a monetary union is that these spreads reflect default risks. The default risk in turn is determined by a number of fundamental variables. The most important of these is the ratio of government debt to gross domestic product (GDP), which is a measure of the potential of a government to service its debt.

Figure 1 presents the ten-year government bond spreads in the eurozone since 1999. These spreads are defined as the difference of the government bond rates of each country with the German government bond rate. The latter is assumed to be free of default risk. The evidence of Figure 1 immediately poses serious empirical puzzles. First, during the period 2000–08 the spreads were very close to zero, indicating that the default risks were perceived to be practically nil for all of the eurozone countries. Yet, as will be shown, underlying fundamentals were widely different among these countries. Second, from 2008 there is a dramatic increase in the spreads. As will be made clear, these increases are significantly larger than the changes in the underlying fundamentals. These puzzles raise the question of whether financial markets may have mispriced risks either before or after the start of the crisis, or in both periods.

In this article we analyze these puzzles and the mispricing question. This will lead us to develop the hypothesis that the spreads can be subject to 'bubbles' – that is, to movements that are dissociated from the underlying fundamentals. Note that underlying the increases in the spreads are the declines in the prices of the government bonds. Thus, the phenomena observed in Figure 1 could also be interpreted as being the result of negative 'bubbles' in the bond prices.

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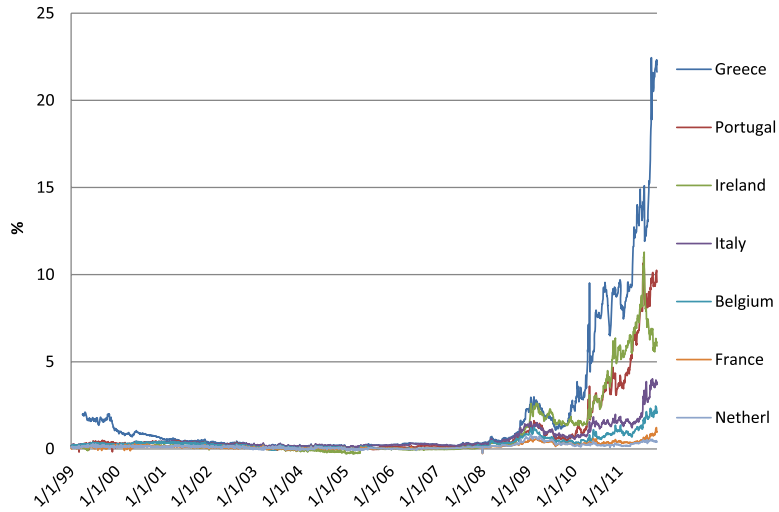
Figure 1: Spreads in Ten-Year Government Bond Rates



Source: Datastream («http://online.thomsonreuters.com/datastream/»).

Since the start of the sovereign debt crisis a burgeoning literature has developed analyzing the determinants of the spreads in the eurozone (Attinasi *et al*., 2009; Arghyrou and Kontonikas, 2010; Gerlach *et al*., 2010; Schuknecht *et al*., 2011; Caceres *et al*., 2010; Caporale and Girardi, 2011; Gibson *et al*., 2011).[1] One of the novel features of this article is to compare the eurozone countries with 'stand-alone' countries – that is, countries that issue their own national currencies. It will be made clear that this comparison is quite revealing. In addition, more than the other existing papers analyzing the spreads in the eurozone, we focus on the departures from the fundamentals, and the possible causes of these departures.[2]

The article is organized as follows. The next section looks at the relation between spreads and the debt-to-GDP ratio so as to find out how close this relation is and how it has changed over time. Then a regression analysis is performed explaining the spreads in the eurozone by a number of fundamental variables. We move on to study structural breaks in these spreads, and then ask the question of whether the bubble-like developments in the spreads are also found in 'stand-alone' developed countries. We develop a test allowing us to identify periods during which spreads get disconnected from fundamentals. Finally, we discuss the theoretical and policy implications of our findings.

I. The Facts about Spreads and Debt-to-GDP Ratios

Before performing a rigorous econometric analysis explaining the spreads, it is useful to look at how the spreads and the debt-to-GDP ratios have evolved over time in the eurozone.

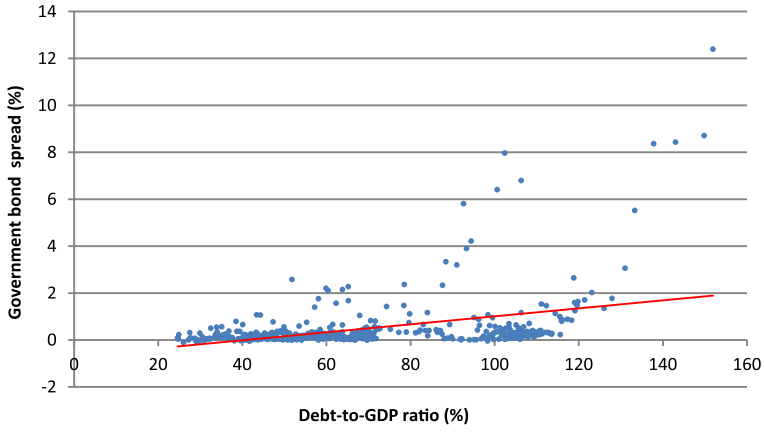
[1] There is of course a vast literature on the spreads in the government bond markets in general. See, for example, the classic Eaton *et al*. (1986) and Eichengreen and Mody (2000). Much of this literature has been influenced by the debt problems of emerging economies. See, for example, Edwards (1984, 1986) and Min (1999).
[2] Gibson *et al*. (2011) also focus on such departures. As these departures have occurred mostly since 2010, the other studies mentioned in Note 1 above did not have sufficient data to detect these.

We do this in Figure 2, which shows the spreads (vertical axis) as a function of the debt-to-GDP ratios (horizontal axis) in the eurozone countries. Each point is a particular observation of one of the countries in a particular quarter (sample period: 2000Q1–2011Q2). We also draw a straight line obtained from a simple regression of the spread as a function of the debt-to-GDP ratio. We observe first that there is a positive relation (represented by the positively sloped regression line) between the spread and the debt-to-GDP ratio – that is, higher spreads are associated with higher debt-to-GDP ratios. We will return to this relationship and present more precise statistical results in the next section.

Second, it appears that only a small fraction of the total variation of the spreads can be accounted for by the debt-to-GDP ratio. While the debt-to-GDP ratio increases from approximately 20 to close to 160 across the sample, the simple regression line tells us that this should lead to an increase of the spread from 0 to approximately 2 per cent (200 basis points). We observe, however, that the spreads increase to approximately 12 per cent (1,200 basis points). There is thus a lot of unexplained increase in the spread. The purpose of this article is to investigate how much of the spread can be explained by fundamental variables (such as the debt-to-GDP ratio) and how much is left unexplained?

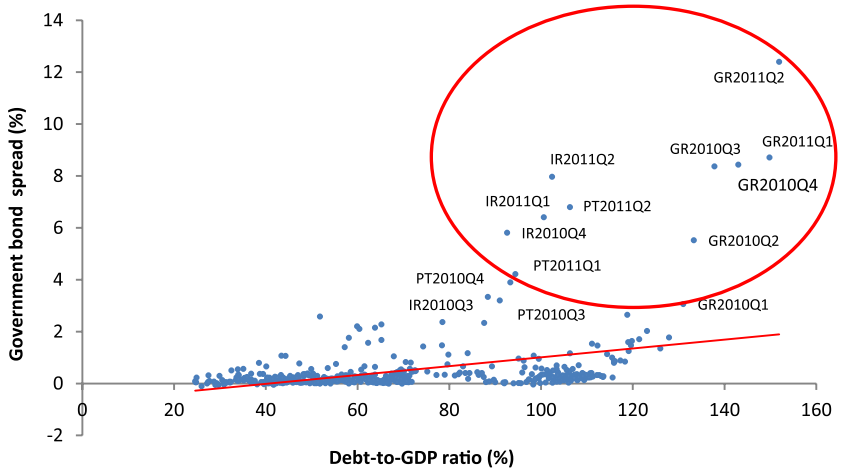
A third observation to be made from Figure 2 is that the deviations from the fundamental line (the regression line) appear to occur in bursts that are time-dependent. We show this in Figure 3, which is the same as Figure 2 but we have circled all observations that are more than three standard deviations from the fundamental line. It is striking to find that all these observations concern three countries (Greece, Ireland and Portugal) and that these observations are highly time-dependent – that is, the deviations start at one particular moment of time and then continue to increase in the next consecutive periods. It is as if 'bubbles' occur in the spreads that lead to ever increasing deviations from the fundamental line. Put differently, the dramatic increases in the spreads that we observe in these countries from 2010 onward do not appear to be much related to the increase in the debt-to-GDP ratios during the same period. Why do we observe this phenomenon that

Figure 2: Spreads and Debt-to-GDP Ratio in Eurozone, 2000–11



Sources: Eurostat («http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/»); Datastream («http://online.thomsonreuters.com/datastream/»).

Figure 3: Spreads and Debt-to-GDP Ratio in Eurozone, 2000–11



Sources: Eurostat («http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/»); Datastream («http://online.thomsonreuters.com/datastream/»).

suggests that spreads increase in a way that appears disconnected from fundamentals?[3] This is another question we want to analyze in this article.

II. The Basic Statistical Model

In this section we specify an econometric model explaining the spreads by a number of fundamental variables. We have selected three fundamental variables: the government-debt-to-GDP ratio, the current account position and the real effective exchange rate. First, the theory tells us that when the government-debt-to-GDP ratio increases the burden of the debt service increases, leading to an ever greater probability of default. This in turn leads to an increase in the spread, which is a risk premium investors demand to compensate them for the increased default risk.[4]

Second, 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.

[3] Note that we will have to show this in a more formal way by introducing additional fundamental variables and by introducing possible non-linear relations between spreads and fundamentals.
[4] We also experimented with the government-deficit-to-GDP ratio, but this variable does not have a significant effect in any of the regressions we estimated.

Third, 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.

We specify the econometric equation both in a linear and a non-linear form. The reason why we also specify a 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 linear equation is specified as follows:

$$I_{it} = \alpha + \delta * CA_{it} + \gamma * Debt_{it} + \mu * REE_{it} + \alpha_i + u_{it} \quad (1)$$

where I_{it} is the interest rate spread of country i in period t, CA_{it} is the current account GDP ratio of country i in period t, and $Debt_{it}$ is the government-debt-to-GDP ratio of country i in period t, REF_{it} is the real effective exchange rate, α is the constant term and α_t is country i's fixed effect. The non-linear specification is as follows:

$$I_{it} = \alpha + \delta * CA_{it} + \gamma_1 * Debt_{it} + \mu * REE_{it} + \gamma_2 * (Debt_{it})^2 + \alpha_i + u_{it} \quad (2)$$

After having established by a Hausmann test that the random effect model is inappropriate, we used a fixed effect model. A fixed effect model helps to control for unobserved time-invariant variables and produces unbiased estimates of the 'fundamental variables'.

A methodological note should be made here. In the existing empirical literature there has been a tendency to add a lot of other variables on the right-hand side of the two equations (see, for example, Attinasi *et al*., 2009; Arghyrou and Kontonikas, 2010; Beirne and Fratzscher, 2012). In particular, researchers have added risk measures and ratings by rating agencies as additional explanatory variables of the spreads. The problem with this is that risk variables and ratings are unlikely to be exogenous. When a sovereign debt crisis erupts in the eurozone, all these risk variables increase, including the so-called 'systemic risk variables'. Similarly, as rating agencies tend to react to movements in spreads, the latter also are affected by increases in the spreads.[5] Including these variables in the regression is likely to improve the fit dramatically without, however, adding to the explanation of the spreads. In fact, the addition of these variables creates a risk of false claims that the fundamental model explains the spreads well.

The results of estimating the linear and non-linear models are shown in Tables 1 and 2. These results lead to the following interpretations. First, both the debt-to-GDP ratio and the real effective exchange rate have a significant effect on the spreads. The current account GDP ratio, however, although it has the right sign, does not appear to be significant. Second, the non-linear specification improves the fit. This can be seen from the fact that the R^2 increases from 0.6484 (in the linear specification) to 0.7995 (in the non-linear specification). In addition, the squared debt-to-GDP ratio is very significant. Thus, an increasing debt-to-GDP ratio has a non-linear effect on the spreads – that is, a given increase of that ratio has a significantly higher impact on the spread when the ratio is high.

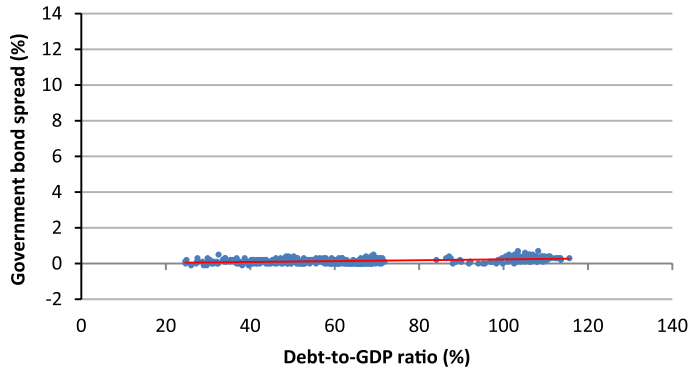
[5] On the role of rating agencies, see Eijffinger (2012).

Table 1: Government Bond Spread (%) in Eurozone

	(1)	*(2)*
Current account GDP ratio	0.0193 (0.0423)	0.0375 (0.0458)
Debt-to-GDP ratio	0.0874*** (0.0186)	–0.0533 (0.0336)
Real effective exchange rate	0.0458* (0.0227)	0.0314 (0.0198)
Debt-to-GDP ratio squared		0.0009*** (0.0002)
Country fixed effect	controlled	controlled
Observations	470	470
R^2	0.6484	0.7995

Source: Authors' calculations.
Notes: Cluster at the country level and robust standard error is shown in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Figure 4: Spreads and Debt-to-GDP Ratios in Eurozone prior to 2008



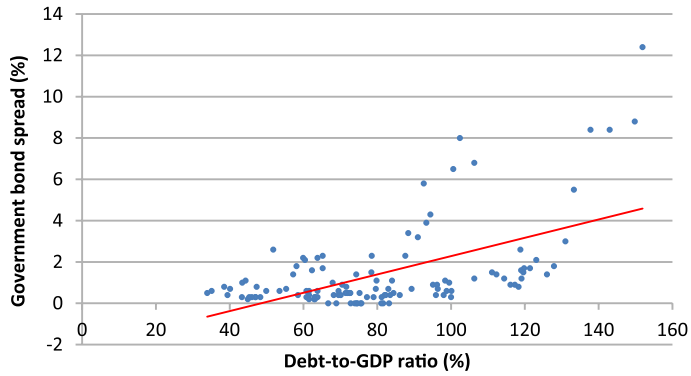
Sources: Eurostat («http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/»); Datastream («http://online.thomsonreuters.com/datastream/»).

III. Structural Breaks

Figures 1 and 2 suggest that a structural break has occurred since the start of the financial crisis. It is important to analyze the nature of that structural break. As preliminary evidence we show in Figures 4 and 5 the plot of the spreads as a function of the debt-to-GDP ratio both before and after 2008. We also show, as in Figure 2, the simple regression line. The contrast between the periods is striking. Prior to the crisis the large differences in the debt-to-GDP ratios (ranging from about 20 per cent to more than 100 per cent) do not seem to have a visible effect on the spreads. Thus, during the pre-crisis period financial markets were saying that debt-to-GDP ratios do not matter for the solvency of countries. As a result, financial markets exerted no disciplinary effect on high debt governments.

Things changed dramatically since the start of the financial crisis (see Figure 5). We now observe that the regression line is positively sloped (and significant) suggesting that suddenly financial markets started to look at the debt-to-GDP ratios in setting default risks. Why the markets suddenly changed their minds remains puzzling. It certainly suggests that they do not always use all available information to price government bonds, which goes against the efficient market theory. It also suggests that serious mispricing of risk occurred.

Figure 5: Spreads and Debt-to-GDP Ratios in Eurozone after 2008



Sources: Eurostat («http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/»); Datastream («http://online.thomsonreuters.com/datastream/»).

We also observe from Figure 5 that even in the post-crisis period there is a large unexplained component. We continue to observe large deviations of the spreads from their fundamental value as presented by the regression line. In addition, these deviations are strongly correlated over time, appearing at the same time and involving the countries mentioned earlier (Greece, Ireland, Portugal). In De Grauwe and Ji (2012) we applied a Chow test confirming that a structural break occurred after 2008.

IV. Stand-Alone Countries

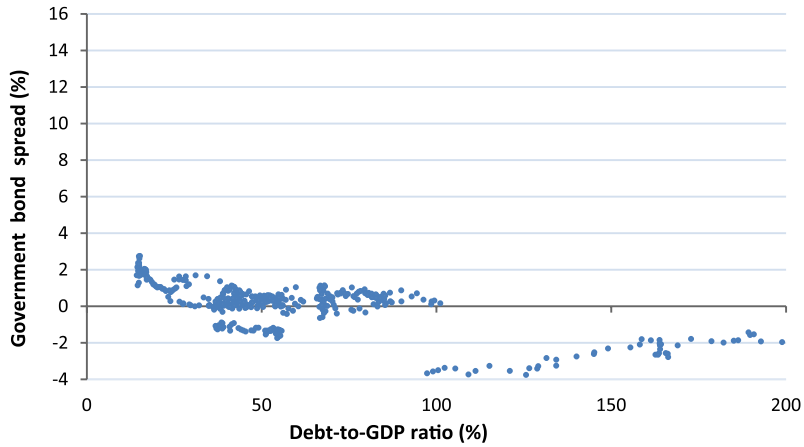
We have observed in the previous sections that there is a strong break in the data of the eurozone. Prior to 2008 financial markets were unconcerned about the large differences in debt-to-GDP ratios and vastly underestimated risks. Since 2008 the debt-to-GDP ratio became important in explaining the spreads. However, we also found out that there is a large unexplained component that is highly time-dependent.

Do the same developments occur in 'stand-alone' countries – that is, countries that are not part of a monetary union and issue debt in their own currencies? We analyze this question in the present section. We selected nine 'stand-alone' developed countries[6] and computed the spreads of the ten-year government bond rates. In order to make the analysis comparable with our analysis of the eurozone countries, we selected the same default risk-free government bond: the German government bond. We could also have selected the American government bond; in fact, doing so leads to very similar results.

It is important to stress that the spreads between 'stand-alone' countries reflect not only default risk, but also exchange rate risk. It is even likely that the latter dominates the default risk as exchange rates exhibit large fluctuations, thereby creating large risks resulting from these fluctuations. Thus, the spreads between stand-alone countries have a very different interpretation from the spreads between member countries of a monetary union. In the latter case, these spreads reflect default risk.

[6] Australia, Canada, Denmark, Japan, Norway, Sweden, Switzerland, United States and United Kingdom.

Figure 6: Spreads of Ten-Year Bond Rates of 'Stand-Alone' Countries, 2000Q1–2011Q3



Sources: OECD («http://www.oecd.org/document/0,3746,en_2649_201185_46462759_1_1_1_1,00.html»); Datastream («http://online.thomsonreuters.com/datastream/»).

In the econometric analysis we will therefore introduce exchange rate changes as an additional explanatory variable of the spreads. In doing so, we isolate the exchange rate risk from the default risk, allowing us to make a comparison with the countries belonging to the eurozone. It is by making such a comparison that one can find out why the financial markets have reacted very differently to similar surges in the debt-to-GDP ratios in stand-alone countries as compared to eurozone countries.

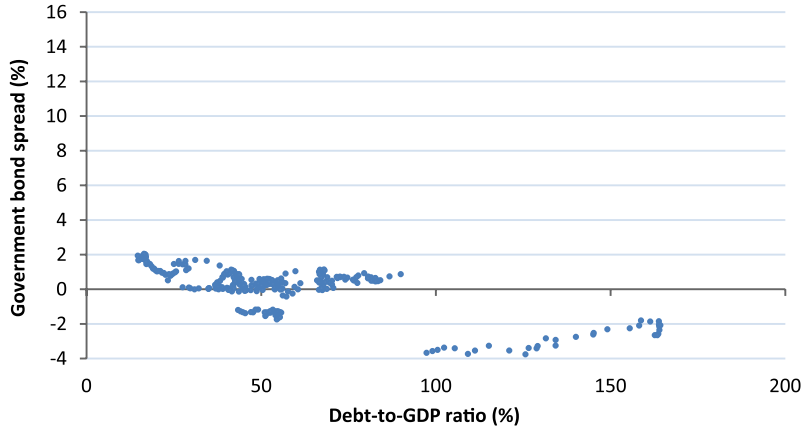
Before we do the econometric analysis, we present the plots of the spreads and the debt-to-GDP ratios in the same way as we did for the eurozone countries above. The result is shown in Figure 6, which shows striking differences from Figure 2 on the eurozone countries.

First, the short-term volatility of the spreads is higher most of the time in the stand-alone countries. This probably has to do with the variability of the exchange rates. We will isolate this effect in the econometric analysis. Second, one country – Japan – stands out with its negative spreads throughout the whole period.[7] Thus, Japan seems to be a special case, which is probably related to the structural appreciation of the yen (see McKinnon and Goyal, 2003). This leads to ingrained expectations of appreciation creating expected future capital gains. These expectations, in turn, allow the Japanese government to issue debt at a lower interest rate. In the econometric analysis, where we add the exchange rate changes and fixed effects for each country we will be able to take care of these problems. A third difference from the eurozone countries is that the debt-to-GDP ratio seems to have a very weak effect on the spreads. Fourth, and most importantly, we observe the absence of 'bubble-like' behaviour of the spreads – that is, we do not detect sudden and time-dependent large departures of the spreads from their fundamental. All the observations, although volatile in the short run, cluster together around some constant number between −2 and 2 per cent for the stand-alone countries without Japan, and between −4 and −2 per cent for Japan. A fifth difference is that there does not seem to be a structural break with

[7] The Japanese spreads are the points below the zero line and above the 100 per cent debt-to-GDP ratio.

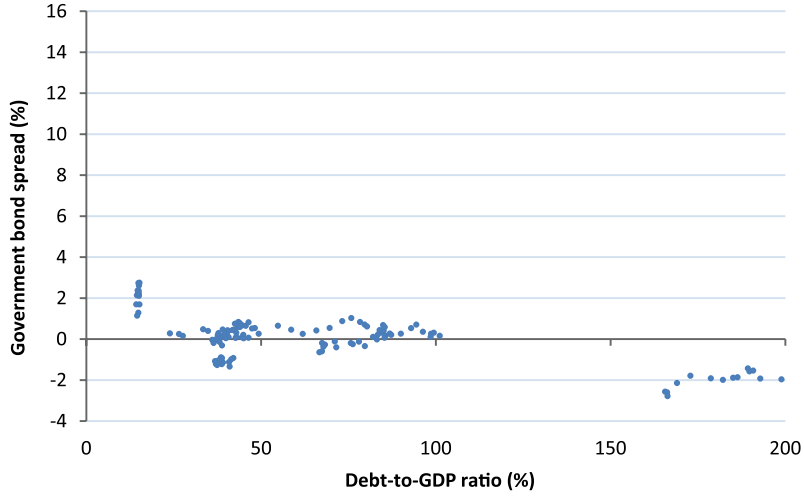
the onset of the financial crisis in 2008. This is made clear from Figures 7 and 8. The financial crisis does not seem to have changed the relationship between spreads and debt-to-GDP ratios – that is, it appears that since the financial crisis the link between spreads and debt-to-GDP ratios has remained equally weak for the stand-alone countries. This contrasts a great deal with the eurozone countries, where this link increased significantly in the post-crisis period. Thus, financial markets are not eager to impose more discipline on the stand-alone countries since the start of the financial crisis, while they are very much so in the eurozone.

Figure 7: Spreads of Ten-Year Bond Rates of 'Stand-Alone' Countries, 2000–08



Sources: OECD («http://www.oecd.org/document/0,3746,en_2649_201185_46462759_1_1_1_1,00.html»); Datastream («http://online.thomsonreuters.com/datastream/»).

Figure 8: Spreads of Ten-Year Bond Rates of 'Stand-Alone' Countries, 2008–11



Sources: OECD («http://www.oecd.org/document/0,3746,en_2649_201185_46462759_1_1_1_1,00.html»); Datastream («http://online.thomsonreuters.com/datastream/»).

We now turn to an econometric analysis. We only interpret the results of a linear specification. The reason is that we could not detect any non-linearity in the effects of the debt-to-GDP ratios on the spreads for the stand-alone countries. As mentioned earlier, we have now added the percentage change in the exchange rate of each stand-alone country against the euro. Ideally, we should use the expected future exchange rate changes. However, estimating future expected exchange rate changes is a perilous undertaking. Therefore, we use the observed changes, taking the view that the observed and forecasted exchange rate changes are highly correlated over a sufficiently long period of time. We could have used the forward rates, but the evidence suggests that spot and forward rates are almost perfectly correlated and embody the same information about the future exchange rate.[8]

The results are reported in Table 2 and lend themselves to the following interpretation. First, as could be guessed from the visual inspection of Figure 6, the debt-to-GDP ratio has no significant effect on the spreads. Financial markets do not seem to be concerned with the size of the government debt and its impact on the spreads of stand-alone countries, despite the fact that the variation of the debt-to-GDP ratio is of a similar order of magnitude as the one observed in the eurozone. Second, the exchange rate changes have a negative but insignificant effect on the spreads. This is no surprise given what we observed from Figures 6 to 8. Third, the current account has a negative but insignificant effect on the spreads. In fact, fundamental variables fail to influence the spreads. Note the high R^2 (0.9088), which is much higher than the eurozone regression (0.6484) in Table 1. The country fixed effects explain a larger part of the spread differences in the stand-alone countries than in the eurozone countries.

We also performed a Chow test for a structural break. In contrast with the results for the eurozone, we could not detect a structural break in the effect of the debt-to-GDP ratio before and after the crisis. Thus, both before and after the emergence of the financial crisis the markets disregard the debt-to-GDP ratios of stand-alone countries as variables that can affect the solvency of countries. We find this result very puzzling and we return to it later.

Table 2: Government Bond Rate Spread against Germany (%) in Stand-Alone Countries, 2000Q1–2011Q3

Current account GDP ratio	–0.0062 (0.0157)
Debt-to-GDP ratio	0.0147 (0.0080)
Real effective exchange rate	0.0117 (0.0126)
Exchange rate against euro	–0.0079 (0.0083)
Debt-to-GDP ratio squared	–
Country fixed effect	controlled
Observations	423
R^2	0.9088

Source: Authors' calculations.
Notes: Cluster at the country level and robust standard error is shown in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

[8] In addition, the evidence is that the forward rate is a biased predictor of the future spot rate (see Fama, 1984).

V. Introducing Time Dependency

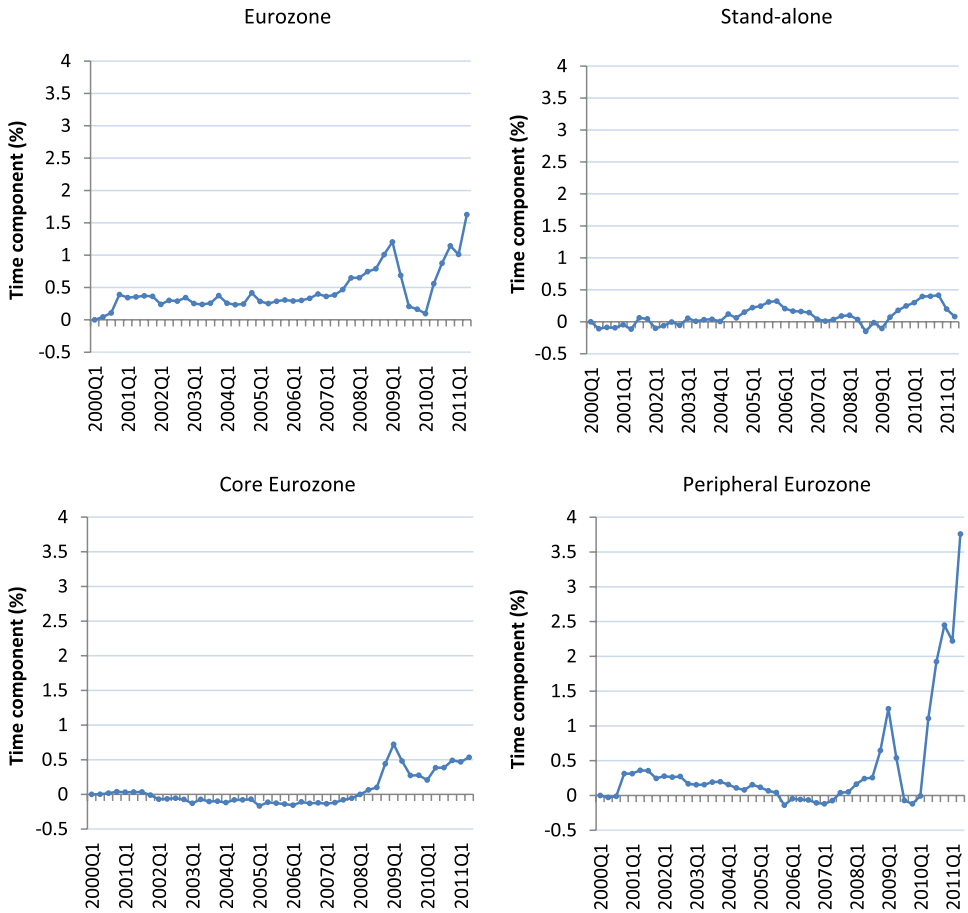
In order to measure the importance of time-dependent effects on the spreads, we introduce time dependency in the basic fixed effect model. In the non-linear specification this yields:

$$I_{it} = \alpha + \delta * CA_{it} + \gamma_1 * Debt_{it} + \mu * REE_{it} + \gamma_2 * (Debt_{it})^2 + \alpha_i + \beta_t + u_{it} \qquad (3)$$

where β_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 fundamental forces driving the yields.

We estimated this model for both the stand-alone and the eurozone countries. In addition, we estimated the model separately for two subgroups of the eurozone: the core (Austria, Belgium, France, Finland, Italy and the Netherlands) and the periphery (Portugal, Ireland, Greece and Spain). The results are discussed in greater detail in De Grauwe and Ji (2012). Here we show the plot of the time effects estimated from the econometric equation. They are shown in Figure 9. The contrast between stand-alone and eurozone

Figure 9: Time Variable, Eurozone and Stand-Alone



Source: Authors' own calculations.

countries is striking. We could not detect significant effects of the time variable in the stand-alone countries. In the eurozone we detect significant time effects, especially since 2008. Thus, during the post-crisis period the spreads were gripped by surges that were independent from the underlying fundamentals. These time effects were especially strong in the periphery during 2010–11. Moreover, the disconnection of the spreads from their fundamentals seems to have been the most pronounced in the countries where the spreads surged most. Put differently, while before the crisis the markets did not see any risk in the peripheral countries' sovereign debt, after the crisis they exaggerated these risks dramatically. Thus mispricing of risks (in both directions) seems to have been an endemic feature in the eurozone.

VI. Theoretical Implications

In the previous sections we found two important pieces of evidence. First, since the start of the crisis financial markets have started worrying about the high debt-to-GDP ratios in the eurozone and have interpreted them as leading to default risk. No such worries have developed in stand-alone countries, despite the fact that debt-to-GDP ratios were equally high and increasing in these countries. Second, we observed that in the eurozone the spreads can move away from underlying fundamentals (such as the debt-to-GDP ratio) in a 'bubble-like' fashion. No such 'bubbles' were observed in our sample of stand-alone countries.

How can these phenomena be explained? In De Grauwe (2011b) a theoretical explanation was provided along the following lines.[9] Members of a monetary union issue government debt in a currency they do not control. As a result, the governments of these countries cannot guarantee that the cash will always be available to pay out the bondholders. This contrasts with stand-alone countries that, because they have their own central bank, can always make sure that the cash will be there to pay out bondholders. The absence of a guarantee that the cash will always be available creates a situation in a monetary union in which a liquidity crisis can arise. And because such a crisis leads to large increases in the interest rate on government debt, it can drive governments of a monetary union into default. The important ingredient in this dynamic is its self-fulfilling nature: when investors start fearing default they will sell the bonds, creating a liquidity crisis that degenerates into a solvency crisis. The fear of insolvency creates conditions that make insolvency more likely.

This fragility has two effects. First, investors become more nervous when the debt-to-GDP ratios increase in member countries of a monetary union (as they did after 2008) than when similar increases occur in stand-alone countries. Put differently, increases in the debt-to-GDP ratios lead to fears of default that in a monetary union can lead to default in a self-fulfilling way. This self-fulfilling dynamic is absent in stand-alone countries. As a result, the sensitivity to the spreads to the debt-to-GDP ratios is weak in the latter countries. Second, the fragility of a monetary union also implies that fears are enlarged

[9] For a more formal model, see also De Grauwe (2011a). There exist many formal theoretical models that create self-fulfilling liquidity crises. Many of these have been developed for explaining crises in the foreign exchange markets (see Obstfeld, 1986). Other models have been applied to the government debt (Calvo, 1988; Gros, 2011; Corsetti and Dedola, 2011).

and, through contagion, can take panic proportions, very much like one observes in banking systems that exhibit a similar fragility (Diamond and Dybvig, 1983). When fear and panic take over, sales of government bonds become massive, creating increases in the interest rates (and the spreads) on government bonds in the absence of observable changes in the fundamentals. When such movements of distrust are triggered, the government bond rates tend to be driven away from their fundamentals. That is exactly what we observed in the data of the eurozone since 2010.

The potential for self-fulfilling liquidity and solvency crises in a monetary union also implies that countries can be driven into bad equilibria that are characterized by high interest rates, a downturn in economic activity and a great pressure to apply budgetary austerity which, because it intensifies the recession in the short run, also has the tendency to raise the debt-to-GDP ratios further (Blanchard, 2011).

There are other possible explanations for the empirical phenomena described in this article. One is that during the period 2000–08 investors believed that there would be bail-outs of the problem countries. As a result, they considered the risks involved in holding Greek and German government bonds to be identical (zero spreads). Suddenly in 2009 the belief that there would be bail-outs disappeared, leading to a sudden increase in the spreads. Although this hypothesis is consistent with the facts, it lacks plausibility. The start of the Greek debt crisis, for example, erupted without any observable news concerning a possible change in the implicit bail-out commitment that, in this hypothesis, was perceived to exist during the previous eight years.

Conclusions

There is now a widespread consensus that financial markets in the eurozone were systematically wrong when during 2001–08 they were charging the same risk premium on Greek and German government bonds despite huge differences in debt-to-GDP ratios of these countries. Today, the same markets apply huge spreads on Greek (and other) government bonds. Many economists take the view that the spreads the markets now impose are correct. Yet why is it that if markets were systematically mispricing risks and failed to see any risk during 2001–08, these same markets suddenly found the truth?

In this article we have argued that financial markets did not suddenly find the truth. Since the start of the sovereign debt crisis they made errors in the other direction – that is, they overestimated risks. We found evidence that a large part of the surge in the spreads of the PIIGS countries during 2010–11 was disconnected from underlying increases in the debt-to-GDP ratios, and was the result of negative market sentiments that became very strong from the end of 2010.

We also found evidence that after years of neglecting them, investors became increasingly worried about the high debt-to-GDP ratios in the eurozone, and reacted by raising the spreads. No such worries developed in stand-alone countries, despite the fact that debt-to-GDP ratios were equally high and increasing in these countries. We interpreted this evidence as validating the hypothesis formulated in De Grauwe (2011b) according to which government bond markets in a monetary union are more fragile and more susceptible to self-fulfilling liquidity crises. The stand-alone countries in our sample have been immune from these liquidity crises and weathered the storm without the increases in the spread.

The story of the eurozone is also a story of systematic mispricing of the sovereign debt, which in turn led to macroeconomic instability and multiple equilibria. During 2001–08, the systematic underpricing of the risk in the peripheral countries led to unsustainable booms in real estate and consumption, until the crash occurred. The systematic overpricing of sovereign risk since 2010 had the effect of pushing these countries into bad equilibria characterized by solvency crises and deep recessions.

The systematic mispricing of sovereign debt observed in the eurozone also had the effect of giving wrong incentives to policy-makers. During the boom years, when financial markets were blind to the sovereign risks, there were no incentives to reduce debts as they were priced so favourably. Since the start of the crisis, financial markets, driven by panic, overpriced risks and gave incentives to policy-makers to introduce excessive austerity programmes.

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