The EU debt crisis:

Testing and revisiting conventional legal doctrine

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Highlights:

► Legal doctrine on the euro sovereign debt crisis rests on strong empirical claims

► We argue that these claims are empirically weak and that legal interpretation should be revisited

► Part of the surge in the bond spreads was disconnected from fundamentals and country's debt position

► Market sentiments and liquidity concerns are dominant drivers in times of crisis

► No-bailout principle and ban on monetary financing should capture non-debt related factors and allow for a lender of last resort

Abstract

Controversies surrounding the European sovereign debt crisis loom prominent in the public debate. From a legal perspective, the no-bailout rule and the ban on monetary financing constitute the main principles governing the legality review of financial assistance and liquidity measures. Interpretation of these rules are full of empirical claims. According to conventional legal doctrine, bond spreads only depend on the country's debt position, largely ignoring other causal factors including liquidity. We test the hypotheses implicit in conventional legal reasoning. We find evidence that a significant part of the surge in the spreads of the peripheral Eurozone countries was disconnected from underlying fundamentals and particularly from a country's debt

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position, and was associated rather strongly with market sentiments and liquidity concerns. We apply our empirical findings to the legal principles as interpreted by recent jurisprudence arguing that application of the no-bailout principle and the ban on monetary financing should be extended to capture non-debt related factors. Also, the empirical results suggest taking recourse to alternative legal grounds for reviewing the legality of anti-crisis instruments and allowing for a lender of last resort in the euro zone.

I) Introduction

The turmoils caused by the European sovereign debt crisis in Europe have also reached the arena of legal scholarship. The step-wise implementation of anti-crisis instruments led to lively controversies among legal commentators on the legality of these measures. While in the literature the debate has been prominent for some time already (for an overview: De Gregorio Merino (2012); Steinbach (2013)), on the level of highest jurisprudence the controversy has culminated into an open opposition more recently – the German Federal Constitutional Court (GFCC, 2014) and the European Court of Justice (ECJ, 2015) have rendered judgments coming to openly different findings on the legality of the European Central Bank's Outright Monetary Transactions (OMT) programme.[1]

At its core, the legal debate revolves around the interpretation of two legal norms laid down in the EU Treaties providing the ground for the legality review of EU anti-crisis mechanisms – the no-bailout principle, which prohibits the assumption of commitments of another Member State (Article 125 of the Treaty on the Functioning of the European Union (TFEU)) and the ban on monetary state financing through the ECB (Article 123 TFEU). According to conventional legal doctrine, both the no-bailout principle and the ban on monetary financing aim at ensuring that Member States are held liable for their fiscal conduct through market pressure (see, inter alia, Borger, 2016; Palmstorfer, 2012; Ruffert, 2011). In this vein, the no-bailout rule prohibits financial assistance because it would undermine fiscal responsibility. Similarly, the ban on monetary financing has been interpreted to ensure that markets apply their "assessment of creditworthiness and

[1] While the GFCC in its most recent finding (GFCC, 2016) accepts the safeguards to be taken by the ECB as requested by the ECJ (2015), it maintains its controversial view as to the unlawfulness of the announcement of the OMT (GFCC, 2016, para. 182).

charge higher risk premiums if there are doubts about a State's fiscal behaviour, resulting in increased interest rates" (Borger, 2016, p. 4).

Legal interpretation of these norms – both in legal scholarship as well as courts' jurisprudence – is full of empirical claims. In a nutshell, legal doctrine assumes a causal relationship exists between a country's debt situation and the corresponding spreads. The doctrine further presupposes that only debt matters for a countries refinancing situation, that is no other determinants impact a country's refinancing conditions – liquidity does not matter, nor does it affect countries' refinancing conditions. In addition, there is the underlying notion that governments have exclusive control over their refinancing situations, as they decide on their budgetary conduct, so that non-market interventions are undesirable.

The legal doctrine of these norms is thus inherently empirical and its claims can be re-phrased as testable hypotheses. Against this backdrop, the purpose of this paper is to challenge the empirical validity of conventional doctrine as it is accepted in parts of legal scholarship and the GFCC's jurisprudence. The goal is to gain insight for an empirically sound interpretation of the relevant norms. To that end, we build on empirical literature indicating the fragility of the above claims. In De Grauwe (2011a, b), it had been shown that Eurozone countries are more prone to sovereign debt crises than non-members of a monetary union. And De Grauwe and Ji (2013) studies a range of economic fundamentals and how they determine a country's bond spreads. They show how bonds spreads are disconnected from underlying debt parameters during the crisis. This conclusion has been confirmed by Saka, et al. (2015).

Based on our econometric analysis, we show that conventional legal interpretation of the no-bailout principle as well as the ban on monetary financing should be revisited in light

of the fragility of the empirical assumptions. Also, our empirical findings highlight that anti-crisis instruments such as the European Stability Mechanism (ESM) and the OMT programme offer the necessary flexibility to react to deviations from the conventional claims on the relation between debt and spreads in times of crisis, which supports a re-interpretation of the above norms depending on factors causal for bond spreads. Moreover, other legal provisions in the EU Treaties that loom less prominent in the discussion, such as the "emergency clause" under Article 122 TFEU might respond to the empirical phenomenon more accurately. Finally, an interpretation of EU rules allowing the ECB to act as lender of last resort would reduce the impact of non-fundamental factors on bond spreads.

The article is structured as follows: Section 2 discusses the legal issues surrounding the European debt crisis and identifies the empirical hypotheses enshrined in the conventional legal doctrine of the no-bailout clause and the ban on monetary financing. Section 3 describes the econometric testing procedure and explores the explanatory power of different variables. Section 4 evaluates the relevance of the empirical results for an interpretation of the legal norms. Section 5 concludes.

II) Legal background

The different types of anti-crisis instruments have gradually expanded over the last few years. Initially, Member States granted bilateral loans to crisis countries; then, the European Financial Stability Facility (EFSF) was created; later, the European Stability Mechanism (ESM) was added; the European Central Bank's Securities Markets Programme (SMP) covering bond purchases since May 2010 and finally the announcement by the ECB that it would purchase an unlimited number of government bonds if necessary (OMT programme). The ECJ subsequently approved these instruments.

In *Pringle*, the ECJ paved the way for the creation of the ESM. Under the ESM, financial assistance is exceptionally permitted when such support is "indispensable to safeguard the financial stability of the euro area as a whole and of its Member States" (ECJ, 2012, para. 142), and the grant of the support is subject to strict conditionality (Adam/Perras, 2013). Subsequently, the ECB's OMT programme was brought before the GFCC for allegedly infringing the ban on monetary financing. The GFCC referred the case to the ECJ asking whether the EU treaties permit the ECB to adopt a programme such as OMT that would foresee purchases of government bonds on the secondary market for the purpose of ensuring the smooth functioning of monetary policy (GFCC, 2014). While the GFCC expressed its doubts as to the compatibility of OMT with the ban on monetary financing, the ECJ (in *Gauweiler*) found the ECB to remain within its monetary policy mandate (ECJ, 2015; Adamski, 2015) – this FCC ultimately accepted the ECJ's acquittal of the ECB while upholding its view on the illegality of the OMT decision (GFCC, 2016; Steinbach, 2017).

The controversy of the two courts is representative both in regard the opposing views within legal scholarship more broadly as well as the contradictory views on the empirical foundations of their jurisprudence offering a rationale for purchasing government bonds or not.[2] This controversy is rooted in the meaning (and the underlying empirical assumptions) one gives to the no-bailout clause and the prohibition of monetary financing and which can be traced along the jurisprudence on the ESM (*Pringle*) and the OMT (*Gauweiler*). These reveal a number of testable empirical claims. The first pertains to the causal relationship between the debt position and the bond spreads. The interpretation

[2] Technically, the GFCC halted the proceedings and requested a preliminary ruling by the CFEU on the question of compatibility of the OMT programme with EU law, as only the CFEU is competent to state unlawfulness of EU measures. However, in its request the GFCC elaborated extensively on the alleged ECB's violation of its mandate.

of Articles 123 and 125 TFEU aiming at keeping budgetary discipline is widely shared in legal literature (Borger, 2016; Palmstorfer, 2012; Ruffert, 2011). Both the GFCC and ECJ agree in principle of the "telos of market pressure" of the two norms begging the question on whether this claim holds empirically (ECJ, 2015, para. 61; GFCC, 2014, para. 71).

Second and closely related (but controversial between GFCC and ECJ and among scholars) is whether other factors can disrupt the relationship between debt and spreads. In this regard, the GFCC followed the reasoning of the German *Bundesbank* by stating that "such interest rate spreads only reflect the scepticism of market participants that individual Member States will show sufficient budgetary discipline to stay permanently solvent" (GFCC, 2014, para. 71). The GFCC thus rejects the possibility that other than debt-related parameters significantly influence the bond spreads and that it considers it impossible to identify the justified and excessive parts of bond spreads – an analysis that is shared by some legal scholars (Siekmann, 2015; Ruffert, 2011) but stands in contrast to the findings of a number of empirical studies (Poghosyan, 2012; Santis, 2012) as well as the assessment of the ECJ. In this respect, the ECJ contradicted the referring court's argument that the premia simply envisage differences in macroeconomic fundamentals between various euro area Member States (ECJ, 2015, para. 72). Again, the difference in arguments between the courts is empirical in nature – are other factors such as non-fundamentals or liquidity reasons really irrelevant for the determination of bond spreads as argued by the GFCC? And are the observed bond spreads justified or excessive parts of bond spreads?

Third, and connected to it, is the question of control over bond determinants. Interpreting Articles 123 and 125 TFEU as to set incentives for states to keep their budget in order necessarily requires entire control over the determinants of bond spreads by the respective country. The strict ban on interventions derived from Articles 123 and 125

TFEU only makes sense if governments keep the determinants influencing the bond spreads under control because otherwise the prohibition of intervention would not reach its goal in setting the right incentives (i.e. maintaining budgetary discipline). This raises an additional empirical question, namely whether the factors influencing the bond spreads can be steered by governments, especially during times of crisis.

The empirical arguments presented reveal a difference in the contingency upon empirical assumption in the jurisprudence of the GFCC and the ECJ, respectively. While the GFCC applies all three empirical claims (causality; debt as exclusive determinant; government's control) rather strictly, the ECJ has seemingly relaxed the empirical ground by supporting its legal interpretation by reference to non-empirical reasons. For example, the ECJ's decision paving the way for the creation of the ESM appears to balance the need for a higher common good (support is "indispensable to safeguard the financial stability of the euro area as a whole and of its Member States") with respect for the ban on monetary financing (by subjecting this support to strict conditionality). In other words, the no-bailout clause is seen by the ECJ in relative rather than absolute terms suggesting that the ECJ's jurisprudence cannot be explained by empirical assumptions only. The analysis will show, however, that interpreting the no-bailout clause in relative terms accurately accounts for the refinancing situations of a country in which the above empirical relationship do no longer exist.

III) Empirical part

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

$$S_{it} = a + bF_{it} + a_i + u_{it} \quad (1)$$

where S_{it} is the interest rate spread of country *i* in period *t*. The spread is defined as the difference between country i's 10-year government bond rate and the German 10-year government bond rate. a is the constant term and a_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. 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:

$$S_{it} = a + bF_{it} + a_i + e_t + u_{it} \quad (2)$$

where e_t is a set of time dummy variables. This measures the common 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. It will allow us to evaluate the importance of fundamental economic factors and time effects. The latter can be interpreted as market sentiments unrelated to fundamentals. To deal with possible differences in time effects between the core and periphery country groups, as suggested in the literature, we also introduce different time

dummies. ce_t represents the common time effects for the core Eurozone group and pe_t for the periphery Eurozone group.

$$S_{it} = a + bF_{it} + a_i + ce_t + pe_t + u_{it} \quad (3)$$

The set of economic and monetary variables F_{it} include the most common fundamental variables found in the literature on the determinants of *sovereign bond spreads.*[3] They are variables measuring the sustainability of government debt. We will use the debt to GDP ratio, the fiscal space of the government, the budget deficit, 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)).

[3] 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 (2012), 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).

As an alternative measure of fiscal sustainability we will also use the *fiscal space* of the government. This is defined as the ratio of the government debt to total tax revenues. It has been used by Aizenman and Hutchinson(2012). It measures the capacity of governments to raise the taxes necessary to service the debt. An increase of the fiscal space variable raises the spreads. Similar to the debt to GDP ratio specification, we will also consider a non-linear relationship between the spread and fiscal space. As the fiscal space variable increases, investors realize that they come closer to the default decision, making them more sensitive to a given increase in the fiscal space.

The debt-to-GDP ratio and the fiscal space variables are stock variables. As a robustness test it will also be useful to use the government *budget deficit* (a flow variable). This has the same expected effects on the spreads as the government debt to GDP ratio.

- 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 GDP.

- 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.

The fundamental variables can be seen as "early warning" variables. They would be in the list of variables that agents trying to forecast the future sustainability of the government debt would use to make these forecasts. Thus, our model can be interpreted to use the current debt to GDP ratio (alternatively the current fiscal space) and the other fundamental variables to obtain forecasts of the future sustainability of the government debt.

We could also have used the forecasts about the future sustainability of the government debt that were made in each period t. The IMF, for example, makes such forecasts. However, it appears that these forecasts are very unreliable producing large errors. In addition, there is the risk that these forecasts are not exogenous, i.e. that they depend on the spreads. Put differently, when the spreads increase, say on the Greek government bonds, forecasters typically react by adjusting their forecasts of the future sustainability of the Greek government debt. As a result of this endogeneity of the forecasts our estimates will be biased. For these reasons we have not pursued this approach.

From the preceding it follows that we can interpret the set of fundamental variables as signaling present and future *solvency* problems of governments issuing debt. Changes in these variables create spreads reflecting *solvency* risk. In contrast the time dummies that, as will be remembered, are independent from the fundamental variables and therefore are not associated with solvency risk, create spreads that by default should be associated with *liquidity* risks that arise from self-fulfilling fears that sovereigns may not be able to rollover their debt.

There is a potential issue of omitted variables here. Our previous conclusion holds provided the model incorporates all relevant fundamental variables. If we fail to incorporate some relevant fundamental variables this conclusion will not hold anymore. We have used here the prevailing economic literature that has identified the fundamentals that matter. There is one exception, though. Some of the econometric studies of the spreads have used measures of risk such as the CDS-spreads as exogenous variables explaining the spreads in the government bond markets (see Aizenman and Hutchinson (2012), Beirne and Fratzscher (2012)). We have criticized this approach in De Grauwe and Ji (2013) on the ground that these measures of risk are not exogenous variables. During moments of crisis risk perception increases and the sovereign debt and CDS spreads increase simultaneously. In no way can it be concluded that the CDS-spreads are exogenous variables causing the sovereign debt spreads to increase. Adding the CDS-spreads into the regression may improve the statistical fitness without however adding explanatory power.

We run regressions on equation (1), (2) and (3) using a sample of the ten original Eurozone countries (without Luxembourg) during 2000-2015 (quarterly data). We did not select the countries that joined the Eurozone after the sovereign debt crisis. It would

not be appropriate to include these countries as they experienced a very different monetary regime during most of the sample period. Note also that Germany is included as the benchmark country.

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 1 presents regressions of the Eurozone countries using the proposed fixed effect models. The standard errors (in brackets) correct for the existence of heteroscedasticity in the error terms and for contemporaneous correlation across panels.

Regressions shown in columns (1) to (3) use the model with the debt to GDP ratio as a measure of debt sustainability. Regression (1) does not have time dummies; regression (2) adds common time dummies for all countries and regression (3) has separate time dummies for the periphery countries. Regression (4) adds the budget deficit to GDP ratio and regression (5) used fiscal space as the alternative measure of fiscal sustainability.
We find that fundamental variables have a significant effect on the spreads in these regressions, except for the real exchange rate and the budget deficit variable. The fiscal space variable provides similar significant results as the debt-to-GDP ratio. Adding time dummies in regressions (2) and (3) has improved the R^2 (goodness of the fit of the model). We conduct two F tests on the time dummies and both tests reject the null hypothesis that the coefficients are jointly equal to zero. The first F test suggests that time fixed effects are needed and the regression with time dummies is shown in column (2) of Table 1. Moreover, the second F test suggests that different time fixed effects are needed for core and periphery country groups and the regression is shown column (3).

Regression (3) gives the best R^2 after allowing for two different time dummies on the periphery and core countries. The estimated coefficients can be interpreted as follows. Increasing government debt ratios lead in a non-linear way to higher spreads. From the estimated coefficients of the linear and quadratic terms we find that the two terms together start being positive when the debt ratio reaches 149. However, to find the effect of *changes* in the spread we have to take the derivative of $-0.0745x + 0.0005x^2$ (where x = debt/GDP). This yields $-0.0745 + 0.001x$. Solving for x we find $x = 74.5$, i.e. when the debt ratio exceeds 74.5% *increases* in the debt ratio start *increasing* the spread. We show the estimated non-linear relationship between spreads and the debt to GDP ratio in figure A1 in appendix.

The real exchange rate has the expected negative sign but the estimated coefficients are not statistically different from zero. The economic growth variable has the expected negative and significant effect on the spreads, i.e. a decline in economic growth raises the spreads as it reduces the capacity of governments to generate tax revenues necessary to service the debt. This is a result that is often found in the literature (see Aizenman and Hutchinson (2012), Beirne and Fratzscher (2012)).

We also find a significant effect of accumulated current accounts on the spreads, however, the coefficient has the wrong (negative) sign. In De Grauwe and Ji (2013) several robustness tests were produced. First, it was found that in the pre-crisis period (1999-2007) the coefficient of the accumulated current accounts is zero. The negative sign is obtained only for the post-crisis period. Second, when estimating the model for the core and the periphery countries separately, it is found that the negative coefficient only applies to the core countries. The periphery countries exhibit a coefficient equal to zero. Our interpretation is the following. The negative coefficient on the accumulated current account appears after the crisis and only in the subsample of core countries. The reason

may be that core countries that had accumulated large current account surpluses (Belgium, Netherlands) also saw their spreads increase (vis-à-vis Germany) after the crisis. We conclude that the current account variable does not provide for a reliable estimate of future sustainability of the government debt.

Statistical significance is one thing; economic significance is another one. We also want to know what the economic significance is of the fundamental variables. Put differently, we want to measure the quantitative importance of the fundamental variables in explaining the movements in the spreads.

In order to obtain information on the economic significance of the fundamentals we have to compare these with the effect of the time dummy variable. We use regression (3) in Table 1 with different time components for the core (Austria, Belgium, France, Finland, the Netherlands and Italy) and the periphery (Spain, Ireland, Portugal and Greece) Eurozone groups. We show the estimated time components (associated with regression (3)) in Figure 1. The shaded areas indicate the time dummies that are significantly different from zero. This confirms the existence of significant time components that led to deviations of the spreads from the underlying fundamentals and thus were signaling risks unrelated to solvency[4].

This time effect is especially pronounced in the periphery countries. In particular we find that in the periphery countries, there was a surge of the spreads during the sovereign debt crisis from 2010 to 2012 that was independent of the movements in the fundamentals. In 2012 there was the OMT-announcement, and we observe that the spreads decline

[4] In De Grauwe and Ji (2013) we applied the same procedure on a sample of standalone OECD countries and could not find significant time dummies, suggesting that liquidity risks did not exist in these countries.

forcefully, again independently of the movements of the fundamentals. Thus, it appears that the announcement of OMT by itself, triggered a large decline in the spreads that could not be associated with improvements in the fundamentals.

The period prior to the crisis is also interesting. We find that prior to the crisis the time dummy becomes increasingly negative. This suggests that the financial markets were increasingly disregarding the fundamentals (some of which were deteriorating in the periphery) and kept the spreads close to zero. Put differently, investors appear to have disregarded the risks of holding sovereign debt from the periphery despite the warnings given by deteriorating fundamentals. The emergence of the crisis can be seen as a wake-up call, which then led investors to overreact and even to panic, producing spreads that (again) were out of line with the underlying fundamentals. The OMT announced by the ECB allowed the fear factor to disappear. This then led to a steep decline in the spreads, that again cannot be explained by the fundamentals in the model. All this seems to suggest that financial markets can easily switch from modes of risk-denial to excessive risk perception.

Table 1 Estimation Results on Spread (%)

Sample period: 2000Q1-2015Q2

	(1)	(2)	(3)	(4)	(5)
Debt GDP ratio	-0.0292*	-0.0416***	-0.0745***	-0.0716***	
	[0.0153]	[0.0150]	[0.0166]	[0.0184]	
Debt GDP ratio squared	0.0004***	0.0004***	0.0005***	0.0005***	
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	
Real effective exchange rate	-0.0318	-0.3985	-0.7420	-0.7502	-0.8786
	[0.8769]	[1.0396]	[0.9237]	[0.9234]	[0.9092]
Accumulated current account GDP ratio	-0.6134***	-0.4849***	-0.4856***	-0.4830***	-0.8155***
(%)	[0.1379]	[0.1215]	[0.1081]	[0.1081]	[0.1129]
Growth rate of GDP	-0.2301***	-0.3404***	-0.2259***	-0.2322***	-0.2596***
(%)	[0.0393]	[0.0531]	[0.0457]	[0.0524]	[0.0510]
Deficit GDP ratio				0.0160	0.0146
(%)				[0.0317]	[0.0307]
Fiscal space					-3.5953***
					[1.0034]
Fiscal space squared					0.7246***
					[0.2316]
Time fixed effects (quarterly)	No	Yes	Yes	Yes	Yes
Time fixed effects periphery countries	No	No	Yes	Yes	Yes
F test on main economic variables	Yes	Yes	Yes	Yes	Yes
F test on time dummies		Yes[1]	Yes[3]	Yes	Yes
F test on periphery time dummies			Yes[2,3]	Yes	Yes
Number of countries	10	10	10	10	10
Observations	620	620	620	620	620
R^2	0.660	0.784	0.866	0.866	0.857

* p < 0.1, ** p < 0.05, *** p < 0.01

Breusch-Pagan LM test is used confirm cross-sectional correlation in the disturbances.

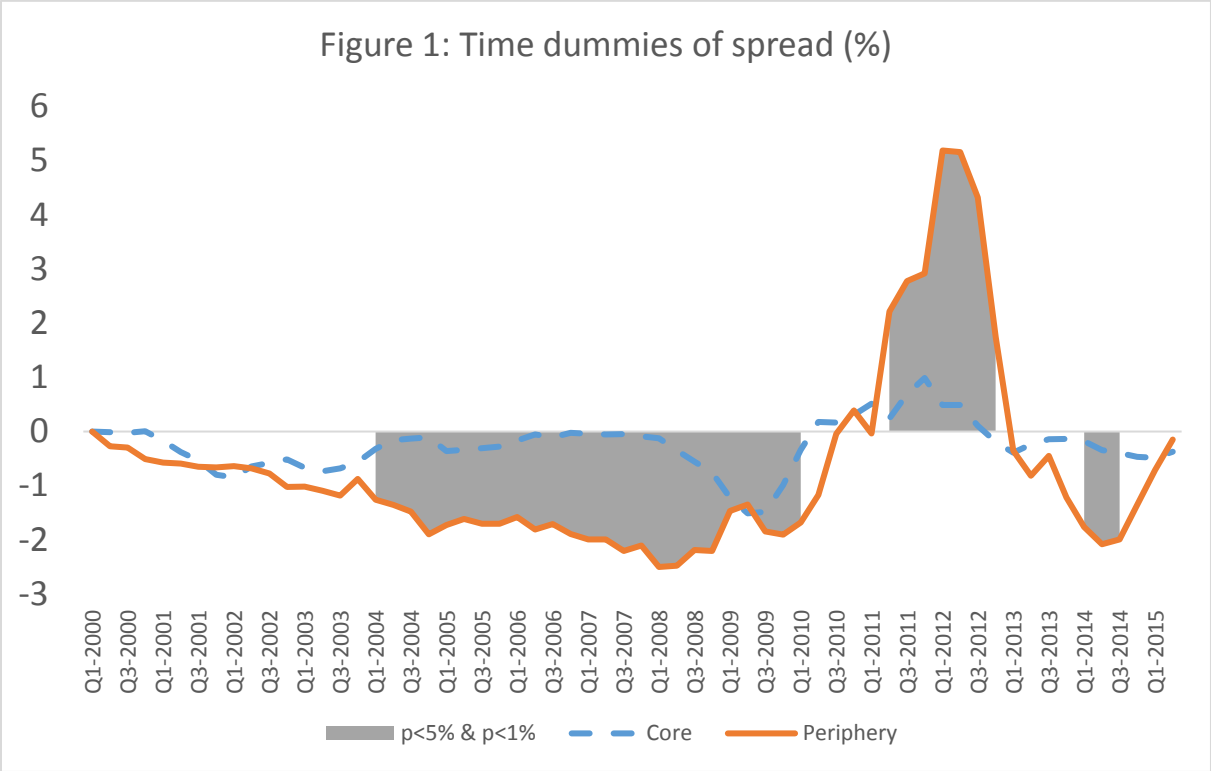
Standard errors are in brackets assuming that the disturbances are heteroskedastic and contemporaneously correlated across panels.

Data sources: the government debt to GDP ratio, the fiscal space, the real effective exchange rate (defined as the relative unit labour costs and expressed as an index with base year 2005), the current accounts and the growth rate of GDP are all obtained from Eurostat.

[1]F test on time dummies: F(61, 544) = 5.10. F test rejects the null that the coefficients for all quarters are jointly equal to zero, therefore time fixed effects are needed.

[2]F test on periphery time dummies: F(61, 483) =4.88. F test rejects the null that the coefficients for all quarters are jointly equal to zero, therefore different time fixed effects are needed for core and periphery country groups.

[3]The time dummies in regression (3) are shown in Figure 1.



Source: own calculations
Note: The vertical axis shows the coefficient of the time dummies using regression (3). It is to be interpreted as percentage points of the spreads. Thus when the coefficient of the time dummy is 5%, as it was in 2012, this means that the spreads were 5 percentage points higher than the spread as determined by the fundamentals.

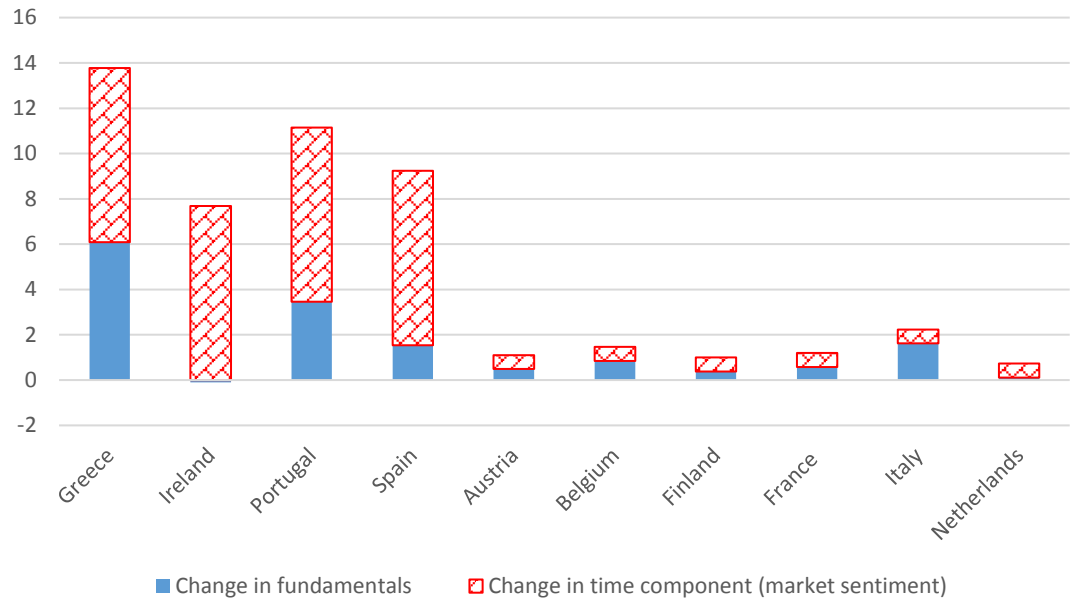
The next step in the analysis consists in estimating the contribution of the fundamentals and the time dummy in explaining the movements in the spreads. We perform this exercise during two periods. The first one is the crisis period, starting from 2008Q1 until 2012Q2 (just before the OMT-announcement). The second (post-OMT) period runs from 2012Q3 to 2015Q2. We show the results in Figures 2 and 3.

We find that during the crisis period, the time dummy is by far the largest explanatory factor in explaining the surge of the spreads for Ireland, Portugal and Spain. In the case of

Greece, fundamentals have a somewhat higher importance: they explain 44% of the surge in the Greek spread.

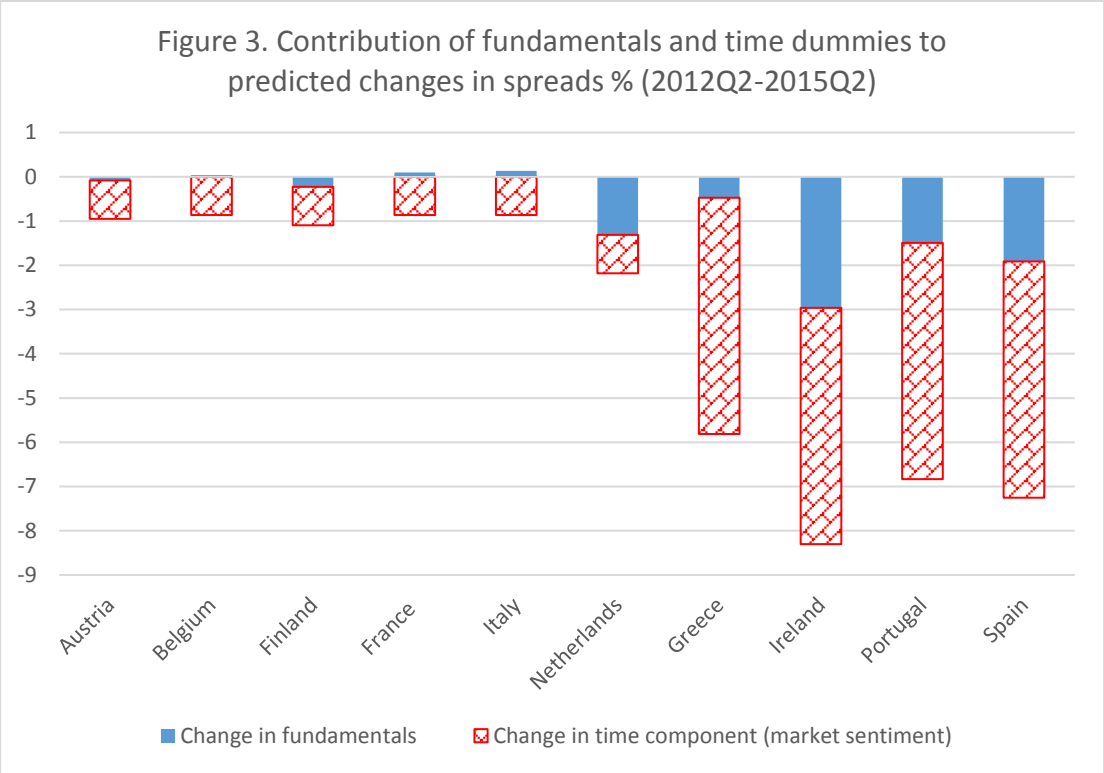
The post OMT-period shows a similar pattern. The time variable explains by far the largest part of the decline in the spreads observed since 2012, suggesting that the decline in the spreads was made possible mostly by the OMT-announcement. Changes in the fundamentals do not seem to have contributed much in explaining this decline.

Figure 2. Contribution of fundamentals and time dummies to predicted changes in spreads % (2008Q1-2012Q2)



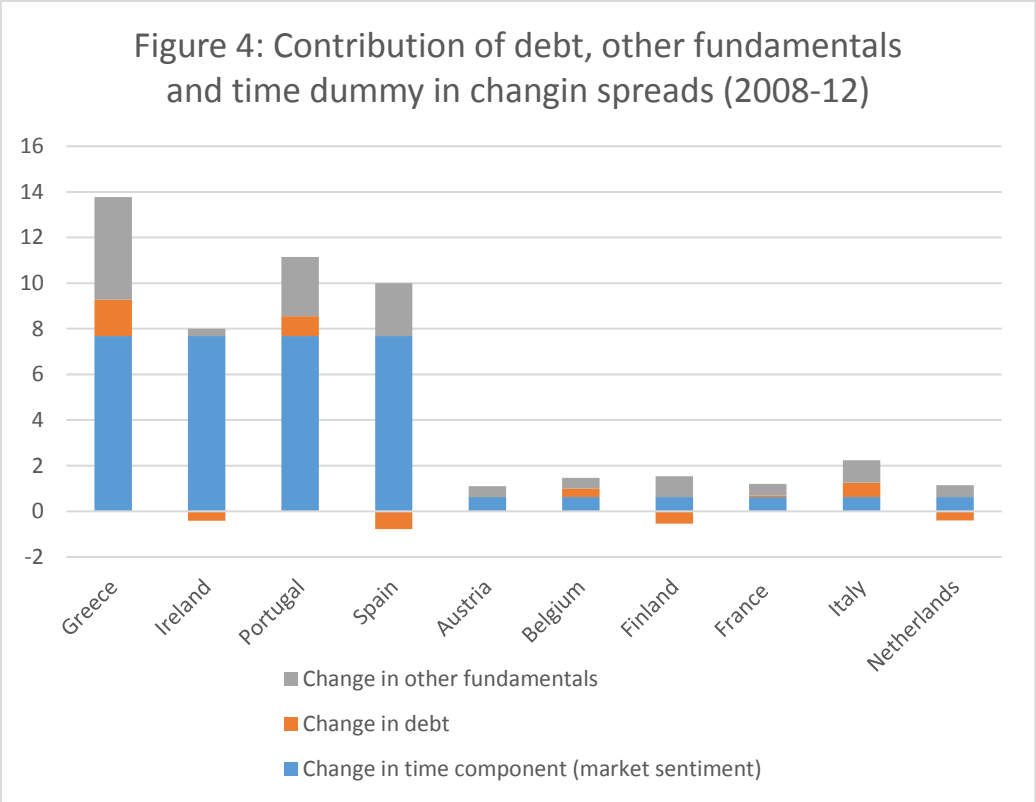
Source: own calculations

Note: with "predicted" we mean the value of the spreads as estimated by the model.



Source: own calculations

Since the legal arguments focus on the influence of the government debt to GDP ratio it will be useful to repeat the previous exercise and to isolate the separate effect of the debt to GDP ratio on the spreads during the two periods. We show the results of this exercise in Figures 4 and 5. Figure 4 shows the decomposition during the crisis period 2008-12. We find that the changes in the government debt to GDP ratio observed during that period contributed very little to the surge of the spreads. This surge is mainly explained by the time dummy, measuring market sentiments, and to a lesser degree by the deterioration of the other fundamentals (economic growth). This suggests that the surge of the spreads during the crisis was unrelated to the movements of the most important fundamental variable, i.e. de government debt to GDP ratio.



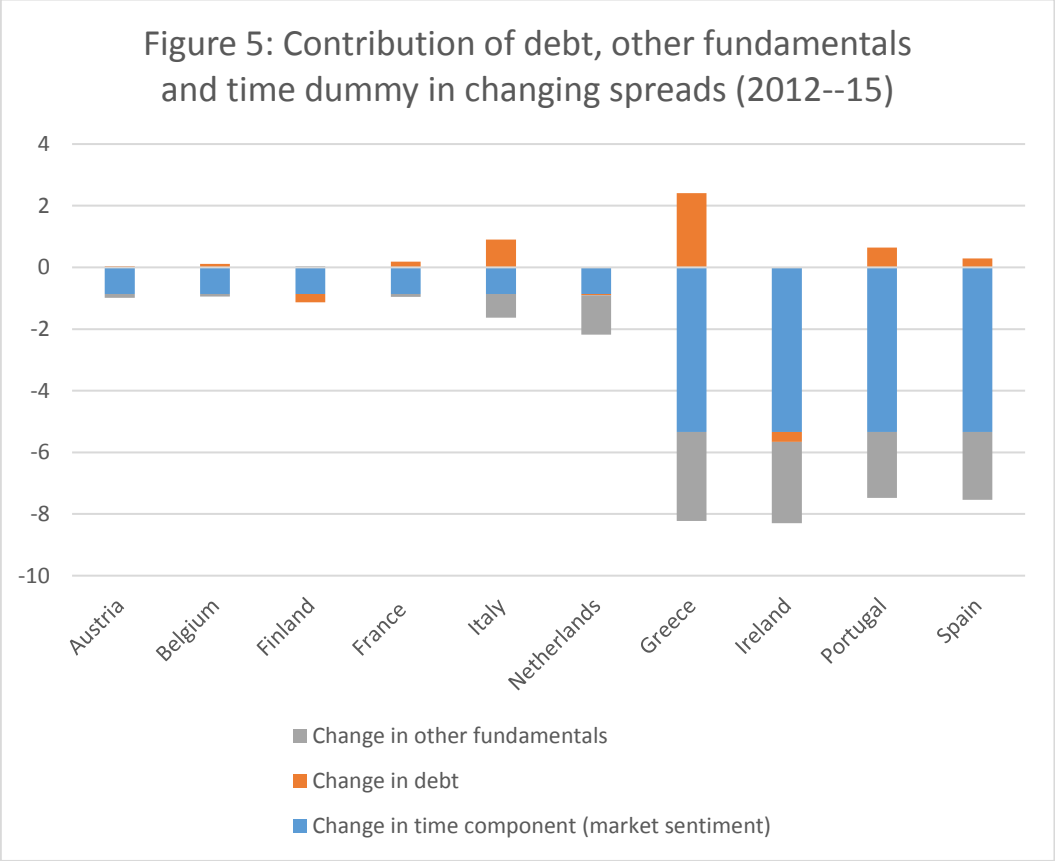
Source: own calculations

Figure 5 shows the same decomposition during the post-OMT period (2012-15). Again we find that the changes in the government debt ratio explain only a small fraction of the decline in the spreads. This decline is mainly driven by the market sentiment variable and by the other fundamental variables, in particular the change in economic growth had some influence, albeit relatively small. As the latter improved somewhat they tended to reinforce the effect of market sentiments.

In this empirical section we have provided evidence showing that during the sovereign debt crisis the surge of the spreads was determined mostly by market sentiments, which we measured by time dummies that are independent from underlying economic fundamentals. In addition, we found that the changes in the debt to GDP ratios observed during this period had practically no influence on the increase in the spreads. Other

fundamentals, in particular the decline in economic growth had some, but relatively small influence.

The conclusions from the empirical analysis of the post-OMT period are similar. The rapid decline in the spreads during 2012-15 was triggered mainly by positive market sentiments, which are likely to have been the result of the OMT-announcement. The changes in the fundamentals, and in particular the changes in the debt to GDP ratios, had very little impact on the spreads.



Source: own calculations

These empirical results suggest that the sovereign debt crisis that erupted in 2010 and that led to spectacular increases in the sovereign bond rates of a number of countries was

not the result of deteriorating government debt positions, but from market sentiments of panic and fear, and to lesser degree a decline in growth. Put differently, the surge of the spreads during 2010-12 was reflecting market sentiments in which panic and fear led investors to massively sell government bonds. These then in a self-fulfilling way triggered a liquidity squeeze making it increasingly difficult for the governments concerned to rollover their debt.

IV) Legal implications of empirical findings

The above empirical results offer insight for the legal interpretation of the no-bailout clause (Article 125 TFEU) and the ban on monetary financing (Article 123 TFEU). While a caveat for general legal inferences must be made given the specificity of the legal reviews and the empirical context, the analysis allows drawing certain conclusions as to the scope of these norms and their application in reviewing the lawfulness of EU debt crisis instruments.

First, the conventional interpretation of the no-bailout principle and the ban on monetary financing assuming a causal relationship between a country's debt position and its refinancing possibilities should be rejected at least in crisis times. In these circumstances, the impact of debt indicators becomes marginal (and may even have an ambivalent effect). A purely debt-focused interpretation of these norms is thus not in line with empirical evidence.

Second, market fears become a predominant driver of spreads in times of crisis highlighting the relevance of liquidity issues. This implies that interpreting Articles 123 and 125 TFEU as enforcing a market logic through strict application of these norms

without considerations to liquidity and other non-debt related indicators does not capture the multiple factors causing a country's refinancing difficulties. Rather, the dominance of liquidity concerns as drivers for government spreads underscores that a lender of last resort is necessary to intervene in times of liquidity dry-up (De Grauwe, 2011b; Steinbach, 2016). This should particularly be reflected in the interpretation of Article 123 TFEU governing the ECB's scope for interventions. The prohibition of monetary financing should not apply to situations where liquidity (not solvency) is the driving force. Similar to the no-bailout rule, the ban's intention to maintain market pressure must be assessed in light of the factors impeding the smooth functioning of monetary policy – this extends to unjustified spreads due to market sentiments as shown above. This finding further underscores the validity of the ECJ's reference to non-empirical grounds of interpretation. More specifically and as mentioned above, in *Pringle* the ECJ referred to the indispensability "to safeguard the financial stability of the euro area as a whole and of its Member States" as ground for interpreting the no-bailout clause in relative terms.

Third, the conventional interpretation of the above norms presumes a country's control over the parameters causing certain spread patterns. In that view, market pressure preserved through strict prohibition of bailouts ensure proper incentives to solid economic policy. This view should not only be rejected given the marginal relevance of debt for spreads. Also, other fundamentals are of limited relevance and often they cannot be directly influenced, as competitiveness (e.g. wage bargaining) and economic growth depend heavily on factors outside of a government's reach. In addition, liquidity shortages reflecting market fears are disconnected from government's policy influence.

Fourth, an interpretation of the above norms allowing account for non-debt related parameters (and particularly for liquidity concerns) suggests the lawfulness of the policy instruments adopted to counter liquidity shortages, in particular the ESM and the OMT programme. Both of these measures have been setup to address the above phenomenon of liquidity shortages. However, in its judgment on the OMT programme, the GFCC relied on the the argument made by the German *Bundesbank*, according to which it is impossible to "divide interest rate spreads into a rational and an irrational part" (GFCC, 2014, para. 71). In the proceedings, the *Bundesbank* had criticized the unfeasibility of determining to what extent risk premiums reflect economic fundamentals or other factors. The above empirical analysis rejects this point of view and rather supports the ECB's intention to restore regular monetary policy transmission mechanisms by neutralising unjustified interest spreads on government bonds.[5] Thus, an empirically sound legal assessment should consider both nature and scope of factors underlying bond spreads. The ECJ's interpretation of Article 123 TFEU to accept unjustified interest rates to hamper monetary policy even if potentially lifting budgetary pressure is in line with above demonstration of empirical findings.

Fifth, further legal inferences can be drawn as to the appropriate legal basis for reviewing the legality of crisis tools. As mentioned above, the scope of no-bailout principle and the ban on monetary financing have to be widened abandoning a purely debt focus and making the application of these norms dependent on non-debt related parameters. Moreover, Article 122 TFEU (the so-called emergency clause) might capture the empirical

[5] It is acknowledged that there is no "proof" of "irrational effects", as there is no random assignment, nor instrumentation. In a strict sense, one cannot exclude that there are omitted variables. But strict econometric proof is out of reach in this context. More importantly, the analysis shows that the position of the GFCC is purely speculative.

reality more accurately than the no-bailout principle. This provision allows a bailout activity of the EU via financial assistance "where a Member State is in difficulties or is seriously threatened with severe difficulties caused by natural disasters or *exceptional occurrences beyond its control* …".[6] This legal provision offers leeway in taking into account a variety of factors going beyond the debt focus of Article 125 TFEU. More specifically, liquidity issues impeding a country's refinancing ability may then be considered in times of crisis as "exceptional occurrences" within the meaning of this norm. Also, the norm's requirement of "beyond its control" is respected where market sentiments are entirely disconnected from fundamental as shown above. The emergency provision should thus be interpreted as allowing financial assistance in case of temporary liquidity problems.

V) Conclusions

Controversies surrounding the legality of financial assistance to countries in crisis have loomed prominently over the last few years. However, both legal analysis as well as relevant jurisprudence rarely (or insufficiently) care about the validity of the empirical claims underlying their legal findings. This analysis sought to fill this gap and discuss the most relevant norms governing the debt crisis in the euro zone by testing the empirical hypotheses implicit in the conventional legal doctrine, which heavily relies on the relationship between a country's debt position (and thus its solvency) and the spreads. In the jurisprudence, the GFCC pursued this conventional doctrine rather strictly, while the

[6] (emphasis added). This exception was used as a legal basis for the EFSM Regulation 407/2010. The EU viewed that the difficulties within the meaning of Article 122 TEU may be caused by a serious deterioration in the international economic and financial environment, see Regulation 407/2010, paras. 2-5.

ECJ interpreted the relevant legal norms in more relative terms thus accounting for the fragility of the assumed empirical relationships.

Our econometric study has highlighted the fragility of the legal reasoning and suggested a re-interpretation of the relevant norms. Most importantly, a legal regime governing the lawfulness of financial assistance cannot be limited to debt parameters but must consider the impact of other fundamentals on spreads and, in particular, the liquidity situation as a result of market sentiments during crisis periods. Taking into account non-debt related factors suggests an application of the no-bailout principle and the ban on monetary financing to the effect that crisis instruments allowing liquidity supply (OMT) and financial assistance (ESM) can empirically be justified and should be considered lawful. Future application of legal standards should incorporate the emergency clause laid down in Article 122 TFEU as legal basis for exceptional financial assistance to account for factors out of a country's control causing financial distress (e.g. extreme market fears), which a narrow interpretation of the no-bailout principle is unable to capture. Finally, the ban on monetary financing (Article 123 TFEU) should be interpreted as compatible with the ECB acting as lender of last resort in order to reduce the impact of non-fundamental impact on government spreads.

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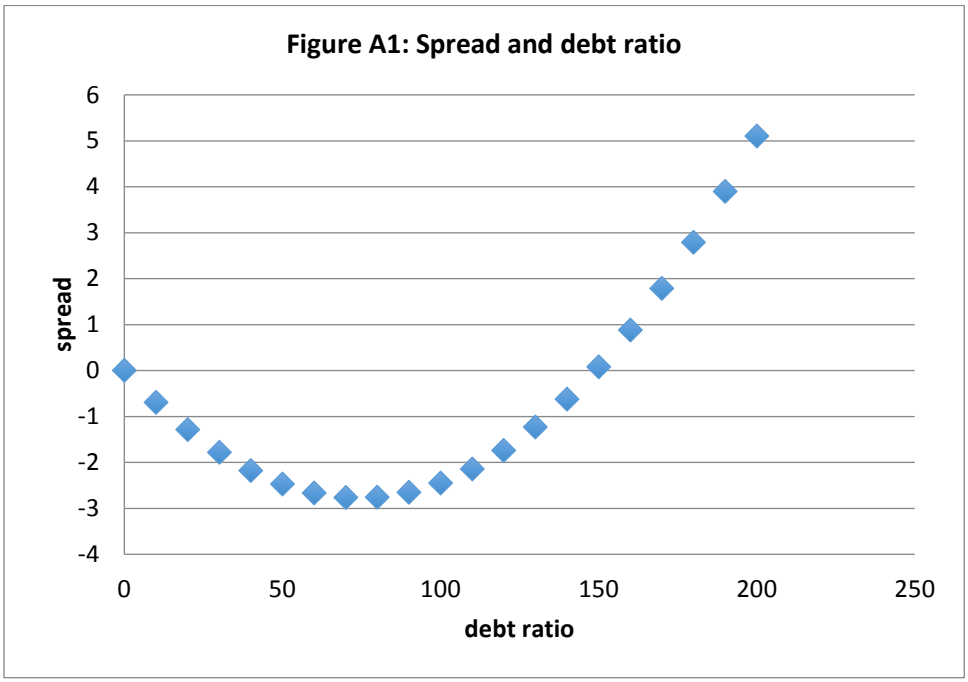
APPENDIX



Note: This figure represents the non-linear effect of the government debt ratio on the spreads as estimated in Table 1 (column 3).