

The Short-run Boundaries for Implementation of Fiscal Policy in the Euro Zone: Lessons from the Current Recession and Policy Suggestions

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Abstract

This study analyzes the short run issues of fiscal policy implementation in the Euro Area and the effectiveness of debt expansion in member economies. The research indicates that both developing economies and those with high levels of accumulated debt face trouble with the expansion and management of their deficits. These differences indicate why the Stability and Growth Pact is not efficient to provide budgetary cooperation between the Euro Zone economies. The theoretical and econometric analysis in this work indicates a strong - and unequal - causal relation between the debt level and risk premium over debt obligations issued in the primary market since the launch of the euro. These results indicate that establishing a primary common area bond market can help to relieve troubled economies, such as Greece, from their structural budgetary problem. Nevertheless, resistance to higher interest on debt amongst the leading economies in the group would make the implementation of such a market a difficult task.

Keywords: Macroeconomic policy, fiscal policy, Euro Zone, Stability and Growth Pact.

JEL Classification Codes: E43, E60, E62, F34, O52

1. Introduction

The European Monetary Union creates a rather unique setting in which to conduct economic policy. On one hand, monetary policy is currently managed by the European Central Bank (ECB) for all member economies. At the same time, fiscal policy, although ruled by the Stability and Growth Pact, is independently conducted by the member countries' governments. *A priori*, fiscal policy implementation does not have much direct influence on other European economies. This setting moreover indicates that fiscal policy becomes more relevant at country level. Since the launch of the euro, the consequences of these centralized and decentralized coordination tools have been both questioned and admired by many economists

Apart from theoretical and incongruent debates about this situation, no clear conclusion can truly be drawn because of relatively mild economic cycles in the Euro Area since the monetary union has been fully established in 1999. However, the mild prosperity and stability in the global economies collapsed in June 2007 when BNP Paribas began blocking withdrawals from three of its funds that were highly leveraged in mortgage-backed securities and the subprime crisis took place.

Furthermore, the European Monetary Union currently faces the threat that some of its economies, notably Greece, could enter into a “double dip” recession as buoyant forces guide budget

deficits and sovereign debt obligations rating has been lowered in the last few months. In addition, many remarks are being made about the capacity of the Euro Zone to conduct economic policy now that the crisis is fully centralized in its members. Eichengreen (2010, p.1 [online]) emphasizes that:

“The financial crisis has breathed new life into hoary arguments about the demise of the euro. They invoke Milton Friedman, who warned in 1998 that Europe’s commitment to the euro would be tested in the first serious economic downturn. That serious downturn is upon us”.

Given these initial considerations, it is easy to visualize the importance of studying the boundaries of fiscal policy implementation and its efficiency in the Euro Zone, precisely when the economic situation of its current members diverges and asymmetric recessionary shocks arise.

Many solutions have been suggested and implemented now that Greece, Portugal, Italy, Ireland and Spain face serious problems managing their debt. Gros and Mayer (2010) proposed the creation of a European Monetary Fund as a means to provide aid for troubled economies and enforce the current legislation. Moreover, many aid packages were given to Greece after it was exposed to a speculative attack in December 2009. The International Monetary Fund, the European Commission and the member economies launched a notorious 750 billion euro aid package for the troubled members in May 2010. Thus, many months have passed and, while the recession remains steady in many member countries, others are recovering relatively well.

These premises indicate that it is feasible to look at the importance of financial markets and how to relate them to the current budgetary situation of the Euro Area. The primary market of debt-securities is one of the main sources of sovereign funding, and it is responsible for the allocation of resources in the economy. The primary market for bonds allows saving surpluses to move from the financial to the real side of economies as governments need to expand their deficit capacities in recessionary periods. Furthermore, investors take into account the situation of macroeconomic variables – especially those that are impacted by fiscal policy - before lending money to the member economies.

This paper analyzes policy efficiency in the Euro Area through the budgetary channel. Fiscal policy is discussed in two levels: short run issues and sovereign funding capacity. The first part analyzes the first level by introducing the complexities that arise from policy spillovers between member economies, studying the variables that are impacted when fiscal policy is adopted and briefly discussing the role of the Stability and Growth Pact. The second part discusses the funding capacity of the member governments in the primary debt market and the impacts that their structural differences have when their deficits increase using a theoretical framework. The final part of this work is an empirical analysis of the efficiency of both the Euro Zone as a whole and four of its member countries - Portugal, Greece, France and Italy. The regression analysis of the model provides empirical evidence for the theoretical framework and, at the same time, studies the interplay of debt and funding mechanisms, taking into account the complexity of the set of economic variables impacted by fiscal policy.

2. The use of Fiscal Policy in the Short Run

The key difference between fiscal policy and monetary policy implementation is that each country inside the EMU has quasi-autonomy of the former. Therefore, we may conclude that fiscal policy gains relative importance when compared with monetary policy at a country level.

Given the current settings of the EMU, the tools available to implement fiscal policy are only non-monetary. In other words, an economy may increase government expenditures or decrease taxes but not implement *seigniorage* or inflation taxes.

Therefore, if we assume that the government of one country increases its expenditures, the demand for money increases, pushing the interest rates up. The first result is a direct increase on GDP through the increase in government expenditures. The second result is a crowding-out effect. As the interest rate rises, the opportunity cost of holding bonds increases and, consequently, the investment

level decreases. Analogously to the case of monetary policy, the single currency shield prevents devaluations or appreciations of the exchange rate between the member economies.

Statically, the analysis of fiscal policy at the country level is not very difficult. Its outcome essentially depends on the difference between the increase in GDP provoked by the rise in government expenditures, the negative impact in productive investments caused by the crowding-out effect, the deterioration of external balance in case the government has high marginal propensity to import (MPI) goods from other countries, and the negative impact of government expenditures on the nominal budget deficit. This leads to larger payments of debt and, consequently, a decrease in the output level. Except for the crowding-out effect, most of the other impacts can be easily observed by policy makers.

The effects of one country's fiscal policy on other economies within the EMU are more obscure. First, this is because other member economies also suffer from the crowding-out effect. For instance, a rise in interest rates due to fiscal policy implementation in Germany would make French investments decrease. French investors also notice the opportunity cost of carrying German bonds and, thus, would divert productive investments in France to benefit from higher German yields. On the other hand, France would have trade benefits if the German economy has a strong propensity to import French goods.

In our example, the overall outcome of the German fiscal policy spillover in the French economy depends on the magnitudes of the crowding-out effect and the trade gains of the French GDP. If the former is higher than the latter, then there is a negative impact. In practice, this scenario applies not only for France but for all the economies within the group.

Outside the EMU level, fiscal policy is not effective. As the interest rate level increases due to the larger demand for money, financial capital moves into euro-denominated assets. This effect provokes an appreciation of the euro and, consequently, a deterioration of the trade balance. Under the flexible exchange rate regime, demand disturbances are fully crowded out when arbitrage is perfect.

2.1. Some Remarks on Economic Policy Effectiveness in the EMU

The overall economic policy capacity of the Euro Area is not much different from economies operating independently using fixed and flexible exchange rate regimes. Quantitatively and statically speaking, the countries inside the Euro Zone are in a better position than other economies to implement short-run economic policy. However, there are several qualitative differences in economic policy making between common currency areas and economies that do not adopt a single currency.

Due to the fact that the European Central Bank has full control over monetary policy, the member economies alone do not have any autonomy to change the nominal money supply or decide the optimal exchange rate level of their own interest. The control over these instruments depends solely on the coordination between the ECB and the 16 member economies. The result of the monetary intervention often depends on the weighted average interest of the member countries.

Second, fiscal policy implementation is in the hands of the independent governments of the member economies and it is subject to spillovers. In this sense, fiscal policy does not differ much from a single economy at country level. However, it is important to re-emphasize that fiscal policy is constrained by the Stability Growth Pact. Countries that violate the constraints of these agreements are usually subject to penalties¹ defined by the European constitution.

Finally, policy mixes are the most difficult to implement because it is very complicated for an economy alone to define which level of monetary policy is the most efficient to coordinate perfectly with its own budgetary interests, and at the same time, control for possible spillovers.

¹ Formally, there are only two types of exceptions authorized by the pact. The first exception is an unexpected event which is outside the control of one or more member economies that leads to an adverse public financial position. The second results from severe economic downturn(s) when the reference value increases due to consecutive falls in annual GDP. Both exceptions are subject to the European Council's decision. In practice, many exceptions have already been considered.

2.2. Divergent Situation of the Member Economies and their Fiscal Policy Goals

The following table shows that the economies that have adopted the euro are generally in quite different situations.

Table 1: Economic situation of member countries in 2008

Member States	GDP		Population		GNI (PPP-adjusted)		Year of adoption of the euro	Government Debt	
	(millions of euro)		(millions)		(per capita)			(%GDP)	
		%		%		Rank			Rank
Germany	2.495.800	26,93	82,3	25,24	29000	7	1999	65,9	6
France	1.950.085	21,04	63,8	19,56	27100	9	1999	68,0	4
Italy	1.572.243	16,97	59,3	18,18	25500	11	1999	105,8	1
Spain	1.088.502	11,75	44,8	13,74	25700	10	1999	39,5	12
Netherlands	595.883	6,43	16,4	5,03	33600	3	1999	58,2	9
Belgium	344.676	3,72	10,6	3,25	28900	8	1999	88,6	3
Austria	281.867	3,04	8,3	2,55	31000	4	1999	65,2	7
Greece	239.141	2,58	11,2	3,43	23600	13	2001	97,6	2
Finland	184.179	1,99	5,3	1,63	29300	6	1999	33,4	13
Ireland	181.814	1,96	4,4	1,35	33900	2	1999	43,2	11
Portugal	166.436	1,80	10,6	3,25	19000	15	1999	66,4	5
Slovakia	64.778	0,70	5,4	1,66	18100	16	2009	27,6	14
Luxembourg	39.346	0,42	0,5	0,15	69300	1	1999	14,7	16
Slovenia	37.135	0,40	2,0	0,61	22800	14	2007	22,8	15
Cyprus	24.922	0,27	0,8	0,25	29800	5	2008	49,1	10
Malta	9.893	0,11	0,4	0,12	24000	12	2008	64,1	8
	Total		Total		Weighted Average			Weighted Average	
MEU	9.266.807		326,1		27827			69,4	

Source: Made by the author based on data of various sources².

This table is useful to observe the current situation of the member economies at a point in time, but it shows no clear pattern regarding their GDP, GNI per capita, population and overall level of debt. For instance, there are economies with different levels of debt and quite similar GDP size. Therefore, it is possible to observe that the general policy goals of these economies are quite different even though they all use the same currency.

The objective of this study, however, is to analyze the economic policy targets of member countries and their potential effectiveness. In the previous sections, we observed the theoretical relationship between monetary policy goals. Usually, when the ECB changes the money supply, the overall impact on the nominal interest rates is quite similar. Empirically, the correlation between the yields of long term securities is almost one for early joiners of the euro during the period between 1999 and 2010. This quasi-perfect correlation confirms the predictions of the theoretical approach.

² The data was obtained using Reuters Ecowin™ and was provided by OECD (GDP, and GNI per Capita), ECB (year of adoption of the euro) and Eurostat (population and government debt).

Table 2: Correlation between 10-Year sovereign bond yield in some EMU countries.

		10-Year Bond Yield						
		EMU	France	Greece	Ireland	Italy	Portugal	Spain
10-Year Bond Yield	EMU	1,00						
	France	0,98	1,00					
	Greece	0,93	0,89	1,00				
	Ireland	0,96	0,94	0,92	1,00			
	Italy	0,98	0,97	0,89	0,93	1,00		
	Portugal	0,97	0,95	0,94	0,93	0,94	1,00	
	Spain	0,98	0,96	0,93	0,93	0,95	0,97	1,00

Source: Made by the author based on data provided by Eurostat.

Under the fixed price assumption, the real interest rate moves in nearly in the same way for all economies. Therefore, the outcome of monetary policy is quite homogeneous.

The analysis of economic policy becomes a little bit more complex when we deal with fiscal policy targets. First, the IS-LM-BP does not provide a clear measure of the impact of fiscal policy efficiency because of the presence of the crowding-out effect, which may differ between the member economies. Second, it also does not provide much information about the externalities of fiscal policy implemented in one country on the other countries, making the evaluation of fiscal policy extremely obscure when we consider the EMU as a whole. Third, the fiscal policy goals of the members generally have the same trend but are not at all homogeneous during the period between 1999 and 2009.

Table 3: Correlation between the public debt in some EMU countries.

		Debt/GDP						
		EMU	France	Greece	Ireland	Italy	Portugal	Spain
Debt/GDP	EMU	1,00						
	France	0,64	1,00					
	Greece	0,82	0,28	1,00				
	Ireland	0,84	0,43	0,85	1,00			
	Italy	0,72	0,07	0,83	0,81	1,00		
	Portugal	0,49	0,94	0,23	0,34	0,05	1,00	
	Spain	0,33	-0,49	0,59	0,45	0,67	-0,61	1,00

Source: Made by the author based on data provided by Eurostat.

The heterogeneity of fiscal policy implementation comes from two major issues: decentralized policy decision making and asymmetric shocks. The first issue is quite obvious, but the second is not. Asymmetric shocks and their responses comprise very complex qualitative factors, such as bureaucracy to create and approve fiscal policy measures, heterogeneous election periods, GDP volatility in business cycles, corruption levels, sovereign debt rating, risk premium, size of the banking system, and the magnitude of the crowding-out effect of each economy.

2.3. The Fiscal Policy Complexity in the Euro Area using a game theory Approach

In order to analyze the dynamics of fiscal policy (and consequently policy mixes in the Euro Zone), it is important to consider the relative importance of fiscal policy at a country level. Regardless of the formal constraints and meetings that the member countries have to discuss fiscal policy goals, the implementation of this type of policy is fundamentally a game of non-cooperative behavior. For instance, countries may or may not act according to the preventive arm of the SGP.

The non-cooperative behavior allows for a mathematical study of the payoffs of the countries in case they decide to implement fiscal policy, or not, to achieve their goals. For simplicity of the analysis, we shall only consider that the EMU is only composed of two economies: x and y . Additionally, these two economies have the same level of endowments and broad characteristics, such

as the propensity to import goods from one another. Finally, we assume that they can only implement expansionary budget policy³ and that this policy has the same time lag and equal outcomes (including their magnitudes). All of the outcomes used are derived from the IS-LM-BP model and the spillover externalities described previously in this section.

From outcomes of expansionary fiscal policy, we may build the following summary table to organize the possible payoffs for each economy. The set of effects that directly impact the economy implementing the fiscal policy is denoted θ and the set of effects that are spillovers in the other economy is denoted ε .

Table 4: Summary of fiscal policy impacts on the country that implements fiscal policy (θ)

Direction	Type of effect	Description
+	ΔY_G	Rise in GDP originated by more government expenditures
-	ΔY_{C-OUT}	Decline in investments caused by the rise in interest rates.
-	ΔY_{X-M}	Deterioration of the trade balance generated by an appreciation of the exchange rate.
-	$\Delta Y_{(G)X-M}$	Deterioration of the trade balance caused by imports from other countries of the EMU (if applicable).
-	ΔY_D	Decline in GDP originated by the higher costs of debt due to the increase in the budget deficit.

Source: Made by the author.

Table 5: Summary of fiscal policy on the other economies (ε)

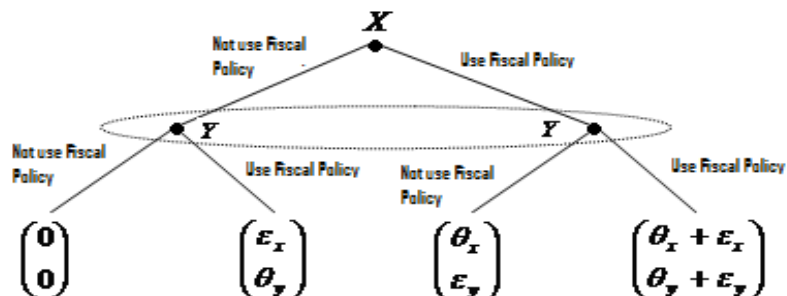
Direction	Type of effect	Description
-	ΔY_{C-OUT}	Decline in investments caused by the rise in interest rates.
-	ΔY_{X-M}	Deterioration of the trade balance generated by an appreciation of the exchange rate.
+	$\Delta Y_{(G)X-M}$	Improvement of the trade balance generated by extra exports to the other EMU economy (subject to the marginal propensity to import of the foreign economy).

Source: Made by the author.

Now that the list of payoffs is organized, we may draw a game tree in extensive non-cooperative form⁴ – indicated by the oval – and the normal form to take into account the set of each country's strategies and their respective payoffs.

³ Although this assumption is quite strong, it works well to limit the set of strategies of each economy and, therefore, simplify the game tree and the matrix of payoffs. In order to capture the outcomes of contractionary fiscal policy, it is possible to study this approach using the same effects in the opposite direction.

⁴ Formally, the surrounding indicates that countries x and y share the same (lack of) information – x does not know what strategy y has chosen. The payoffs are listed on the bottom of the tree.

Figure 1: Fiscal Policy implementation game in extensive and normal forms

Source: Made by the author.

The dominant strategy for each country depends solely on the value of θ . At a country level, ε is a random variable and does not matter when fiscal policy is implemented. If $\theta > 0$, implementing fiscal policy becomes the dominant strategy. However, if $\theta \leq 0$ the dominant strategy is not to intervene in the economy. Hence, depending on the beliefs of each country towards fiscal policy, a different Nash-equilibrium is achieved. For instance, if θ_x and θ_y are > 0 then both countries would implement fiscal policy and the Nash-equilibrium would be $(\theta_x + \varepsilon_x; \theta_y + \varepsilon_y)$.

The main problem with this approach is that, since the value of ε is random at a country level - either because countries do not care about what is happening to the other countries or because they simply do not have enough information from the other economy - any strategy achieved is not necessarily the best one. The optimal cooperative strategy also depends on the value of ε . Therefore, this game ends up in a situation analogous to the prisoners' dilemma.

At the EMU level, the outcomes of fiscal policy would be the following:

- a) Both countries implementing fiscal policy.

$$(\theta_x + \varepsilon_x + \theta_y + \varepsilon_y) = \Delta Y_G^{x+y} - Y_{C-OUT}^{x+y} - (2 - MPI_y - MPI_x) \Delta Y_{(G)X-M}^{x+y} - \Delta Y_{X-M}^{x+y} - \Delta Y_D^{x+y}$$

- b) Only one country (x) implementing fiscal policy.

$$(\theta_x + \varepsilon_x) = \Delta Y_G^x - \Delta Y_{C-OUT}^{x+y} - (1 - MPI_y) \Delta Y_{(G)X-M}^{x-y} - \Delta Y_{X-M}^{x+y} - \Delta Y_D^x$$

Before describing the total welfare brought by the fiscal policy strategies, it is important to consider that the intra-EMU trade balance effects of each economy cancel out when we use this approach. The underlying logic is that part of the goods imported by the government of country x must come from country y and vice-versa. (We only consider two economies, which is not true for the EMU). If the $MPI_{x,y}$ is equal to 1, then trade balance improvements and deteriorations become a zero-sum game at EMU level. However, if the $MPI_{x,y}$ is equal to 1, then the net trade balance effect of fiscal policy would be the same as in a simple opened economy. Despite being a zero sum game, the intra-EMU trade balance effect causes unequal redistribution of changes in GDP when we consider its 16 countries.

The difficulties arise when only one country is implementing fiscal policy. The first problem occurs because both countries are caught by the crowding-out effect. Another issue depends on the marginal propensity to import goods of the country that is implementing fiscal policy. If this propensity is high enough to make $\varepsilon > 0$, then both economies are positively impacted. However, the economy that did not expand its debt level becomes a free-rider. Although economically the outcome is optimal for both economies, political issues may arise in the future. If the MPI is not sufficient to make $\varepsilon > 0$, then the net spillover effect generates a negative externality for the other economy. In this case, when we consider the overall welfare, we obtain $\Delta Y_x > \Delta Y_{EMU} > \Delta Y_y$. Even if the outcome in the EMU level is positive (weighted average of the group of countries), fiscal policy may stimulate short-run output

growth divergence between the member economies. The aggregate output level of the EMU does not provide any information about the situation of individual economies.

Although this game framework is useful to analyze the outcomes of fiscal policy in the EMU, the overall outcome of fiscal policy remains a puzzle. First, it is very complex to obtain the payoffs for every member country taking into account their individual trade agreements. Moreover, the 16 economies studied have heterogeneous dynamics, political lags and different inclination to implement fiscal policy. Third, one attempting to apply this type of model would end up studying a very complex matrix of θ and ε . Depending on the situation of each economy, the values of these variables may not even be constant over time. Therefore, the analysis of fiscal policy implementation of any member economy at a given period of time becomes a specific case.

In practice, if $\varepsilon \neq 0$ this economy would have to implement fiscal policy to achieve its optimal policy goal objective at a later point in time. Let us say that $\varepsilon_j < 0$. If this is so, economy j would have to use budgetary policy to compensate the negative spillover caused by the policy implemented by country i. As j increases its government expenditures, there could also be a reverse spillover in country i. This spillover spiral may be kept to infinity. The problem is that, depending on the magnitude of ε , undesired spillover effects increase the interest rate volatility in the EMU whenever uncoordinated fiscal policy is implemented.

One possible solution that may help improve the effectiveness of fiscal policy at the Euro Zone would be the creation of specific trade agreements between member governments and companies of the monetary union. These agreements may be very useful to limit undesired spillovers in certain members of the group. Casella (2001) argues that countries could buy permits from other member countries if they want to run higher deficits. This authorization to buy deficits could be a useful means of generating positive spillovers on other economies through the trade balance channel.

Regardless of the intense critiques, the Maastricht Treaty and the SGP are useful general enforcement means to promote coordination of fiscal policy implementation in the short run. At the same time, these means of coordination work to limit the use of fiscal policy. Usually, other economies become aware of one another's budgetary plans whenever the Excessive Deficit Procedure occurs. Formally, the member economies have, *a priori*, a deficit of 3% over GDP to implement policy without any risk of being penalized by the European Commission. From this premise, we may raise the following questions: How much benefit can each member obtain from a given threshold of fiscal policy freedom? Are the costs of implementing fiscal policy the same for all the economies inside the EMU? How does this constraint on fiscal policy implementation impact the economies on the medium/long-run?

3. Evaluating the Sovereign Funding Capacity and the Role of the Risk Premium in the EMU

According to the Mundell-Fleming model, European countries that are inserted in the Euro Area may not conduct monetary policy due to perfectly fixed exchange rates and, consequently, the fact that the LM curve becomes endogenous. In addition, we can observe that EMU members do not have significant political influence to make changes in the money supply because it is determined by the European Central Bank. However, this model is incomplete when we deal with several stylized facts.

Depositary institutions, such as commercial banks, may increase or decrease the level of excess reserves in order to deal with the opportunity cost of lending when interest rates are low or high. When the opportunity cost of carrying money is very low, as it has been since the subprime crisis, banks may increase their level of reserves and reduce the money supply. Moreover, when debt levels, insolvency and/or risk aversion increase, banks tend to be more rigid when lending money even when the interest rates are high.

The bond market in the Euro Zone is currently decentralized. This means that governments have freedom to issue obligations to fund their deficits and, consequently, their respective debts according to their own needs.

Before running a deficit, the government issues bonds to obtain funding for any expense that will not be covered with tax revenues. The go-around, an auction in which large financial institutions bid in primary market of the State's debt securities, occurs as the government increases the money demand and attracts the money supply towards its offers of bonds. Therefore, the more debt it wants to issue, the more interest and/or discount it would have to accept to pay so that the supply of money would follow⁵. Note that the supply of money becomes more sensible to the constraint of risk aversion as sovereign debt and deficits increase.

Fiscal policies usually have very large internal lags because they are subject to decisions of bureaucratic public institutions. Once implemented, they have very small external lags. For example, if the government decides to decrease income taxes, consumers and producers feel the benefits almost automatically.

During recent crisis periods, many countries were able to still increase their Debt/GDP ratio. This could be caused either by a fall in GDP, an increase in the overall sovereign debts or both.

Moreover, it is important to consider that there is no exchange rate fluctuation among these countries because they all use the same currency. Consequently, the only two components of interest rates are the cost of money itself and a risk factor, which are defined by the covered interest rate parity. Thus, larger economies with less debt, such as Germany, often have lower interest rates than smaller economies, like Greece, because of the latter component.

3.1. Theoretical Model

Given these initial conditions, we turn our focus to the analysis of the dynamics of fiscal policy efficiency across different countries in the Euro Zone. For simplification purposes, we study only the government side.

In order to neutralize undesired effects caused by changes in interest rates through monetary policy, the proxy used to measure changes in interest rate in Euro Zone provoked by the government is the risk premium over Germany. Due to the fact that Germany is the largest economy in the single currency area and offers the lowest yields on its obligations, we assume that any other country has to offer a premium over the German yields in order to expand its debt level. It is reasonable to consider that investors are risk averse and will not invest in riskier countries if the same level of interest is paid in a less risky one⁶. Additionally, we consider that the German yield is risk-free and only reflects the cost of money.

The stylized facts indicate that the higher the interest rate premium that a country in the Euro Zone offers, the higher the opportunity cost of funds to expand its debt. Thus, we can assume a function for debt that is increasing at a decreasing rate when using the interest rates premium over the German obligations as the explanatory variable⁷. From these features, we may assume that the function of total debt level (D) is the following.

$$D = r_p^\psi \tag{1}$$

If we assume that this function is differentiable, we get (2) and (3):

⁵ Although the money market graph is still the same as in the Mundell-Fleming model, this proposition has a little contradiction with the traditional approach used by the mainstream of macroeconomic theory. This model affirms that increases government expenditures push interest rates up. In fact, the situation that governments face when offering bonds suggests that the interest rate is a determinant of budget deficit, not the opposite.

⁶ We ignore any subjective factors, such as patriotism and transaction costs, that would lead to noise trades and international portfolio bias.

⁷ This variable is used because of its underlying components stated earlier.

$$\frac{\partial D}{\partial r} = \psi r_p^{\psi-1} > 0 \tag{2}$$

$$\frac{\partial^2 D}{\partial^2 r} = \psi(\psi - 1) r_p^{\psi-2} < 0 \tag{3}$$

The ψ is a parameter that determines how much interest rates impact the capacity of generating debt. In order to obtain the desired effect for the opportunity cost, we must consider that the value of ψ is $0 < \psi < 1$.

This function is quite analogous to the widely known Cobb-Douglas production function. From this perspective, it is easy to view that there are decreasing returns to budget deficit as the debt level increases. In other words, in order to obtain a fixed deficit level, a country that has higher debt would have to offer much higher interest rates. This type of function usually has the INADA condition⁸ as an underlying assumption. This condition only reinforces the opportunity cost of the government. If the debt level is very low, the government can obtain extremely large amounts of funding at a low cost, and at the same time, avoid the risk aversion constraint of financial institutions. On the other hand, as debt is high, the cost of funding becomes more expensive due to increased fear of counterparty risk when higher yields are accepted by the government.

A very important measure that can be obtained is the elasticity of fund raising capacity (4). This measure can be seen from two different perspectives: those of the fund raisers and the investors. The government wants to have the greatest possible elasticity, meaning that whenever it offers higher yields on the go-around, investors would increase their supply of savings with less reluctance. The dealers, on the other hand, want this elasticity to be as low as possible so that they can obtain higher yields and/or discount on the bonds they purchase for their respective institutions with the least default risk possible.

Replacing (2) on (4), we get (4*):

$$\mathcal{E} r_p / D = \frac{\partial D / D}{\partial r_p / r_p} \tag{4}$$

$$\mathcal{E} r_p / D = \frac{\psi r_p^\psi}{D} \tag{4*}$$

The equation (4*)⁹ plays a crucial role in the negotiation of debt and, consequently, the decision making of those who will provide funding to the government. First, the debt level is negatively related to the elasticity of funding. This means that the more debt a country has, the less flexible the money supply will be. Second, the yield accepted by the government has a positive relation with the elasticity of funding. The more interest is offered, the more money supply is available, but at a decreasing rate that is dictated by the value of ψ .

All the equations observed by now are fully dictated by the parameter ψ . However, without a more detailed approach to its meaning, it is impossible to make a critical analysis of most of the equations above. Technically, this parameter is the marginal fund raising capacity¹⁰ (5).

Substituting D by (1) and $\partial D / \partial r_p$ by (2), we obtain:

$$MFRC = \frac{\partial D / \partial r_p}{D} \times r_p = \frac{\psi r_p^{\psi-1}}{r_p^\psi} \times r_p = \psi \tag{5}$$

⁸ Formally, this condition can be written as follows: $\lim_{r_p \rightarrow 0} D = \infty$ $\lim_{r_p \rightarrow \infty} D = 0$

⁹ Although we could still simplify the elasticity even further and obtain ψ , it is more logical to use this elasticity as a function of r and D to obtain a better understanding of the issue. Therefore, we shall assume that this elasticity is not constant overtime.

¹⁰ The name may seem strange at a first glance, but if we make the analogy between the functions developed and any neoclassical production function, it is easy to visualize that this term is similar to the marginal productivity of capital.

Now we have a concrete meaning to ψ . The larger its value, the better for the government because the funding curve will be correspondingly steeper. This means that for a given level of interest rate, higher levels of debt that can be reached. This happens because investors are more tolerant towards sovereign default risk. In other words, the elasticity of money supply in the go-around meetings becomes more flexible towards debt issuance via increases in yields/discounts of bonds.

Up to now, the focus of this model was only at the debt level. It is also important to consider the inter-temporal budget deficit of the government in order to have a deeper analysis of fiscal policy. By definition, the budget deficit is divided in two parts: primary and nominal deficit¹¹. The first is the difference of taxes (t) and expenditures (G)¹². The latter is equal to the first plus the interest that the government pays on its accumulated debt ($r \times D$). Formally, when we differentiate the debt level with respect to time, we obtain the nominal budget deficit \dot{D} .

Replacing (1) for D in (6), we get (6*):

$$\dot{D} = (G - t) + r \times D \quad (6)$$

$$\dot{D} = (G - t) + r \times r_p^\psi \quad (6^*)$$

To obtain the growth of debt overtime we divide (6*) by (1):

$$\frac{\dot{D}}{D} = \frac{(G - t)}{r_p^\psi} + r \quad (7)$$

In order to adapt the model to the standardized debt to GDP measure, we consider that:

$$D = \omega GDP \quad (8)$$

Substituting (8) on (7), we obtain the “law of motion” of debt over GDP over time:

$$\frac{\dot{D}}{GDP} = \left[\frac{(G - t)}{r_p^\psi} + r \right] \times \omega \quad (9)$$

Equation (9) shows that for a given level of debt, GDP, taxes, government expenditures, interest rates, and premium; a country that has a higher ψ can run deficits more efficiently than a country with lower ψ . This was already predicted, but the underlying reason is because the weight of the primary budget deficit, which is the effective part of an expansionary fiscal policy, decreases as the parameter ψ increases. The proportion of extra debt that is used to fund new primary budget deficit is smaller. Thus, further government expenditures with a fixed level of tax revenue become cheaper with a higher level of ψ . On the other hand, the weight the non-nominal part of the budget deficit increases. However, this part is much more manageable when conducting fiscal policy inter-temporally because the debt level is pegged to the interest rate and the adjustment factor ω .

As seen in (8), this second parameter, ω , basically reflects the overall level of debt when compared to the GDP. On the deficit level, it reflects the previously accumulated debt compared to the GDP on present budget deficits. For instance, if a country is in a recession, where its GDP decreases, the value of ω increases which makes the inter-temporal effective cost of funding more expensive.

When the nominal budget deficit is fixed (all other variables are constant), a country with higher ψ and lower ω is able to sustain a higher debt level overtime.

¹¹ We ignore *seigniorage* because money printing is fully determined by the BCE, which is independent of government interventions.

¹² In order to be a primary deficit, the condition $G > t$ must be satisfied.

3.2. Assessing the Overall Debt Quality of Member Countries

If we recall again the components of the deficit (6), it is easy to see that the government has two ways to handle its expenditures by deriving the budget with respect to its endogenous components. Furthermore, the covered interest rate parity (CUP) for any member country benchmarked with Germany indicates that the interest rate offered is only partially endogenous. The yield offered in Germany is independent of other countries actions. Therefore:

$$\frac{\partial D}{\partial G} = \partial G - \partial t + \partial r_p \times D = 0 \quad (10)$$

The first order condition of the deficit indicated that the government can only manage to increase its expenditures through increases in the tax levels or through rises in the risk premium. The ECB can help indirectly by lowering the cost of money component of the CUP, but its action is exogenous to independent governments. This conclusion is quite redundant because the risk-averse investor's logic implicitly indicates these tendencies, but it also shows another important feature. If the benchmark yield is truly risk-free then increases in the cost of money, holding the risk premium constant, have a direct impact on the cost of funding of other member economies besides Germany. This remark is crucial because it shows that the individual means to counterbalance individual country expenditures – taxes and the premium – are subject to substitution effects due to changes in the interest rate in other member economies (in this example, Germany).

Taxes shall be considered a good source of sovereign funding because they represent cash flowing directly to the hands of the government without any need to borrow money from other countries. On the other hand, increased household taxation may also stimulate tax avoidance. The idea of decreasing elasticity of tax revenues due to higher taxation is not at all original in economics¹³ but crucial to understanding why taxes are not the only source sovereign funding. Roughly, whatever expenditure is not funded with tax revenues is obtained from the bond market. Therefore, if we normalize expenditures to 1, the government condition to launch fiscal plans can be written as follows:

$$1 = G = st + (1 - s)(r_p + r_{Germany}) \quad (11)$$

The term “s” is the proportion of households that pay taxes and, consequently, “st” is the effective tax revenue. The ratio of good expenditures to bad expenditures, which are determined by the overall interest rate level, describe the quality of member economies sovereign expenditures and indicate its potential to repay future debt. The higher the ratio, the better quality of funding a country has.

$$Quality_Ratio = \frac{st}{(1 - st)(r_{Germany} + r_p)} \quad (12)$$

3.3. The Endogenous Relation between the Premium and the Debt Level

As described before, the premium plays a two-sided role in government debt. On one hand, the premium allows individual member countries to increase their debt level by declining the demand for obligations in other countries. At the same time, the premium is part of the interest payment factor that composes the nominal deficit. Given these two conditions, it is difficult to define the predominant role of the premium in the short run.

In order to access this complex causality relation more efficiently, the Granger causality and two co-integration tests were used on the debt level and the risk premium over the period between January 2000 and February 2010 on a monthly basis. The Granger test is a strong indicator of the causality direction. The Johansen Co-integration test and the stationary residual of the regression between the debt level and the premium determine if the relationship between these two variables is

¹³ This is exactly what is proposed by the Laffer curve.

not spurious¹⁴. In order to check if the residual is stationary, the augmented Dick-Fuller unit-root test was used.

Table 6: A quantitative assessment of the causal relation between debt and the risk premium

Johansen Co-integration test summary

Included observations: 117

Series: DEBTEUROZONE YLDP

Lags interval: 1 to 4

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Selected (5% level) Number of Cointegrating Relations by Model (columns)					
Trace	0	1	1	1	1
Max-Eig	0	1	1	1	1

Co-integration test

Null Hypothesis: RESID_EZ has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 3 (Automatic based on SIC, MAXLAG=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.716576	0.0232
Test critical values:	1% level	-4.037668	
	5% level	-3.448348	
	10% level	-3.149326	

*MacKinnon (1996) one-sided p-values.

Source: Made by the author.

Pairwise Granger Causality Tests			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Probability
YLDP_EZ does not Granger Cause DEBT_EZ	121	141.471	0.00000
DEBT_EZ does not Granger Cause YLDP_EZ		1.16045	0.28357
Lags: 2			
YLDP_EZ does not Granger Cause DEBT_EZ	120	9.20703	0.00020
DEBT_EZ does not Granger Cause YLDP_EZ		0.85347	0.42861
Lags: 3			
YLDP_EZ does not Granger Cause DEBT_EZ	119	5.90528	0.00089
DEBT_EZ does not Granger Cause YLDP_EZ		0.70486	0.55107
Lags: 4			
YLDP_EZ does not Granger Cause DEBT_EZ	118	3.22044	0.01535
DEBT_EZ does not Granger Cause YLDP_EZ		2.24684	0.06865
Lags: 5			
YLDP_EZ does not Granger Cause DEBT_EZ	117	2.32574	0.04778
DEBT_EZ does not Granger Cause YLDP_EZ		2.35545	0.04533
Lags: 11			
Null Hypothesis:	Obs	F-Statistic	Probability
YLDP_EZ does not Granger Cause DEBT_EZ	111	1.43853	0.17018
DEBT_EZ does not Granger Cause YLDP_EZ		2.15307	0.02428

¹⁴ The Granger and the Johansen co-integration tests are relevant; however, both are limited when we deal with present and future values of the variables at the same time. Their intrinsic objective is to orient the research. Therefore, they do not determine the study of co-integration. The determinant of co-integration is the residual co-integration testing made to determine if the residual, "resid_ez", is stationary in level. Note that the result of this test was also positive for co-integration.

Lags: 12			
YLDP_EZ does not Granger Cause DEBT_EZ	110	1.38717	0.18800
DEBT_EZ does not Granger Cause YLDP_EZ		1.90705	0.04459
Lags: 13			
YLDP_EZ does not Granger Cause DEBT_EZ	109	1.59091	0.10458
DEBT_EZ does not Granger Cause YLDP_EZ		2.36075	0.00981
Lags: 14			
YLDP_EZ does not Granger Cause DEBT_EZ	108	1.67744	0.07731
DEBT_EZ does not Granger Cause YLDP_EZ		2.05400	0.02364
Lags: 15			
YLDP_EZ does not Granger Cause DEBT_EZ	107	1.57672	0.10061
DEBT_EZ does not Granger Cause YLDP_EZ		1.91364	0.03457

Source: Made by the author.

For a 5% significance level, both co-integration tests demonstrate a strong causality relation between the two variables. Moreover, the Granger causality test shows quite significant results when using small lags. Between 1 and 5 lags, it indicates that it is the premium that impacts debt. However, as the number of lag increases, the causality relation becomes the opposite (as it is possible to see when we use 11-15 lags).

To summarize, these results indicate that the premium is a variable that individual governments should manage carefully when making their expenditure decisions. The premium is a strong means of sovereign funding in extremely short periods of time. However, it becomes detrimental to the quality of government expenditures because it increases the liability side of the sovereign balance sheet in longer periods of time.

4. An Empirical Assessment of the Risk Premium differences and its Consequences

As seen in the previous sections, the key point of the theoretical model is to analyze the debt level of a country as a function of the interest rate premium over the German economy interest rate and, if applicable, exogenous shocks introduced as dummy variables¹⁵.

Regardless of the simplification of reality, the model itself seems to be a satisfactory theoretical road map of the fundraising capacity of the EMU member economies. However, it is crucial to confront the structural format of the theory with real data in order to check if this model is suitable for empirical analysis.

Therefore, a time-series regression analysis was conducted to check how reliable these explanatory variables are - especially their respective parameters - and how they impact the debt to GDP ratio of the European economies.

Due to the large amount of countries in the single currency area, only four countries - France, Italy, Greece, and Portugal - plus the Euro Zone as a whole were studied¹⁶. These countries were chosen because of their GDP differences and debt similarities. From the table 4, we can draw two extreme cases of the funding capacity curve in the year 2008.

The first case is France and Portugal. France is the largest economy in the group (after our benchmark country), has a high GDP per capita relative to the other countries, and had a debt to GDP ratio of 65% in 2008. On the other hand, Portugal is a much smaller economy, with the lowest GDP per capita among the countries that adopted the euro in 1999, and had a debt to GDP ratio very similar to that of France. Moreover, their level of debt ratio is below the weighted average level of the Euro Zone.

The second case is Italy and Greece. Italy is the third largest economy and had the highest debt to GDP ratio of the group. The second country, Greece, is one of the smallest economies and had the

¹⁵ This variable was added because in some countries, the distributions of some residuals were not statistically normal distributions. Further details may be observed in the appendix of this work.

¹⁶ Weighted average of the 16 countries

second highest debt to GDP ratio among the countries studied. Although these two countries do not have the same debt to GDP ratio, the value of their ratios is quite similar and is far above the weighted average level of the sixteen countries of the European Monetary Union.

The data used starts from January 2000 until February 2010 on a monthly basis, providing a total of 122 observations. The starting year is only one year after most member countries adopted the euro as their official currency¹⁷. The significance level adopted for all tests is 5%.

Consequently, the model may be expressed in as simple equation:

$$D_x = \psi \text{Yieldpremium}_x + \sum_{n=0}^{\infty} \beta \text{Exogenous_Shocks}_x + \mu_x \quad 18$$

Note that there is a distortion from the original theoretical model. The computation of the risk premium parameter ψ is different from the one proposed originally because of the non-linearity of ψ . Therefore, the linear and logarithmical approximations of the funding function were used for its computation.

4.1. Description of the Variables¹⁹

Debt to GDP ratio: the gross consolidated debt as a percentage of the GDP used was the forecast²⁰ produced by the Directorate General for Economic and Financial Affairs. This forecast takes into account the expanded definition of operational debt²¹ defined by the Maastricht treaty and published by Eurostat. It is important to consider that this variable may have undesired changes due to changes in GDP over time.

Yield premium: the long-term government bond yield indicator published by Eurostat. The data are central government bond yields (monthly average) on the secondary market, gross of tax, with around 10 years residual maturity, taking into account on the run and off the run securities. This indicator of the long-term cost of borrowing reflects in part a country's economic performance, budgetary position, and monetary policy. The premium was obtained by discounting the yield of each country studied by the "risk free" German yield. This subtraction neutralizes the undesired effect of interest rate changes due to monetary policy²². The theoretical model and the correlation table below indicate a positive influence of this variable on the dependent variable during the period studied. All the rates were measured in using basis points. This variable was obtained from Eurostat.

¹⁷ Despite the fact that Greeks only adopted the euro in 2001, they made an attempt to join the single currency area in 1999. However, they were not accepted because they did not satisfy the conditions imposed by the European Union at the time.

¹⁸ μ is the residual – stochastic term – of the model.

¹⁹ Although the variables used come from different sources, all data gathered was obtained using Reuters EcoWin™. Reuters is considered to be one of the most reputed providers of information, including data, about economies and financial markets from their original sources.

²⁰ The forecast is a very strong approximation of the original ratio. The official ratio was not used because Eurostat has not yet published it for the years of 2009 and 2010.

²¹ The Maastricht Treaty defines that the total sovereign debt comprises the obligations of central government, state government, local government and social security funds. GDP used as a denominator is the gross domestic product at current market prices. Debt is valued at nominal (face) value, and foreign currency debt is converted into national currency using end-year market exchange rates (though special rules apply to contracts). The national data for the general government sector are consolidated between the sub-sectors. The basic data are expressed in national currency, converted into euro using end-year exchange rates for the euro provided by the European Central Bank.

²² This is according to the assumptions of the theoretical model.

Table 7: Correlations between yield premium and the debt to GDP ratio

		10 Yr Yield Premium						
		EMU	France	Greece	Ireland	Italy	Portugal	Spain
Debt/GDP	EMU	0,51	0,46	0,69	0,63	0,46	0,49	0,51
	France	0,48	0,49	0,55	0,60	0,55	0,47	0,40
	Greece	0,52	0,44	0,63	0,59	0,42	0,49	0,56
	Ireland	0,77	0,73	0,85	0,81	0,69	0,74	0,81
	Italy	0,46	0,38	0,61	0,48	0,35	0,46	0,52
	Portugal	0,49	0,49	0,52	0,59	0,57	0,50	0,40
	Spain	0,01	-0,05	0,11	0,00	-0,14	-0,01	0,12

Source: Made by the author.

Exogenous shocks: because the residuals of the regressions for the Euro Zone and Italy did not follow normal distribution, two outlier dummy variables were introduced to correct excessively long tails of their respective distributions in the period of the Subprime crisis and the Greek crisis. The first, called subprime, comprised the period from July 2007 until February 2010. The second, Greek crisis, comprised the period between December 2009 and February 2010. The expected relationship between these variables on the endogenous variable depends on the nature of the shock. These two variables were created by the author.

German Yield: the risk free component of the Euro Zone interest rates. The yield characteristics are identical to those of the risk premium, but for the German obligation market only. This variable was also obtained from Eurostat.

Output Gap: the difference between actual and natural output computed by the IMF according to their methodology²³. This variable is useful to define how fiscal policy is used and to control for fluctuation of the dependent variable caused by undesired variations on the GDP (denominator of the debt/GDP ratio). This variable was obtained from the International Monetary Fund data basis (WEO).

Inflation: Consumer Price Index (CPI) seasonally adjusted used by the IMF. This variable was obtained from the International Monetary Fund data basis (WEO).

Current account balance: the percentage of GDP that corresponds to surpluses or deficits on the current account. This variable was obtained from the International Monetary Fund data basis (WEO).

4.2. Results of the Empirical Model

The explanatory variable was significant for all countries when a single regression was used. As mentioned, the residual of Italy and the Euro Zone weighted average did not follow a normal distribution at 5% level of significance²⁴. In order to correct for this issue, the dummies Subprime and Greek crisis were used. The explanatory variable remained significant in all cases, except in Portugal.

Moreover, the magnitude parameters indicate exactly the relationship expected in the theoretical model. The results of the five models before and after introducing the dummies strongly indicate that developing economies of the Euro Zone have a massive disadvantage to raise their debts when compared to the richer countries in similar debt conditions in times of economic stability. Moreover, countries with very high debt levels, such as Italy and Greece, despite their economic conditions, have a lot of difficulty of implementing expansionary fiscal policy when compared to countries with lower debt levels. Consequently, poorer economies and/or economies with high levels of accumulated past debt become much more susceptible to recessionary periods because of decreased capacity to implement fiscal policy.

²³ The methodology used by the IMF is not available to the public.

²⁴ Although the p-value of the Jarque-Bera probability indicated that the residual followed a normal distribution at 1% level in both cases.

Table 9: Summary of the regression analysis²⁵

	OLS				
Dependent Variable (Debt/GDP)	Portugal	France	Euro Zone	Greece	Italy
Premium	0.115 (0.0000)	0.191 (0.0010)	0.071 (0.0000)	0.035 (0.0000)	0.033 (0.0001)
Constant	58.462 (0.0000)	61.984 (0.0000)	67.972 (0.0000)	98.032 (0.0000)	105.510 (0.0000)
Observations	122	122	122	122	122
R-Squared	0.45	0.38	0.26	0,39	0.12

	OLS*				
Dependent Variable (Debt/GDP)	Portugal	France	Euro Zone	Greece	Italy
Premium	-0.020 (0.3265)	0.122 (0.0010)	0.079 (0.0000)	0.040 (0.0000)	0.0582 (0.0000)
Constant	60.551 (0.0000)	62.093 (0.0000)	68.043 (0.0000)	98.424 (0.0000)	105.159 (0.0000)
Subprime	10.904 (0.0000)	1.707 (0.1180)	-1.697 (0.0010)	-2.984 (0.0000)	-3.214 (0.0000)
Greek Crisis	11.717 (0.0001)	9.116 (0.0000)	8.270 (0.0000)	7.166 (0.2756)	7.958 (0.0000)
Observations	122	122	122	122	122
R-Squared	0.55	0.53	0.53	0.55	0.55

Source: Made by the author.

In addition, the average impact of the subprime crisis on the economies studied was rather negative on their debt level. These values indicate that most of the countries in the Euro Zone had to offer much higher premiums than on stable periods in order to increase their current debt. The shocking point is that France and Portugal, possibly because they had relatively low debt levels before the crisis, had positive impact on their debt to GDP ratio coming from the subprime dummy²⁶. This result indicates the relative importance of debt convergence to 60% of GDP established by the SGP. Both economies had debt levels close to the one proposed by the European Commission in late 2007 while Italy and Greece had their respective levels of debt above 90% of their GDP and showed little or no signs of convergence since 1999.

On the other hand, when we introduce the Greek Crisis the effect is inverted. It is reasonable to consider that of these countries had a significant decrease on their GDP and an increase on their absolute debt levels during the last year. Despite this fact, the Greek Crisis dummy was not significant for Greece, but significant for all other countries. This indicates the potential presence of competition among member countries for bond issuance. The positive impact of the Greek Crisis dummy on France, Portugal and Italy's debt may be partially due to the current situation of the Greek economy.

The interplay of debt and premium pointed out by the Granger causality test becomes a strong indicator of why countries that have higher need to increase their premium to accommodate cyclical or discretionary deficits are having trouble managing their post-subprime debt levels. The amount of absolute debt/GDP increase was not much different in all cases. This value was of approximately 20-25%. However, the French premium reduced again to around 40 basis points and the premium of the other countries remained the same or even increased when compared to their values during the peak of

²⁵ T-statistic (p-values) expressed in parenthesis. Data from January 2000 to February 2010.

²⁶ The Portuguese premium t-statistic was not significant.

subprime crisis²⁷ in late 2008. This shows that countries that had lower values on the parameter were exactly those that had to increase their premiums significantly during the subprime crisis in order to accommodate more debt.

4.3. An Empirical Application of the Theoretical Model

In the majority of the countries studied, the linear functional fit better than the logarithmical approximation of the format proposed in the theoretical setting. However, it is relevant to consider that the latter was always significant but had lower Adjusted R-Squared. Therefore, the linear approximation was considered for the following computations.

The features and remarks of the theoretical model essentially remain the same, except for the fact that decreasing returns to debt²⁸ do not apply when the initial function of debt is linear. This feature indicates that dealer institutions generally do not become more risk averse when the premium increases substantially.

Under the linear format, if we disregard the constant that resulted from the regressions, the key equations of the model become the following:

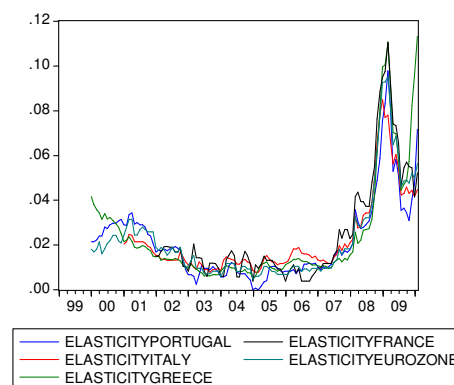
$$\mathcal{E}r_p/D = \frac{\psi r_p}{D} \quad (13)$$

$$\frac{\hat{D}}{GDP} = \left[\frac{(t-G)}{\psi r_p} + r \right] \times \omega \quad (14)$$

$$MFRC = 1 \quad (15)$$

We can compute the instantaneous elasticity of fund raising capacity (13) for the economies studied when using the parameters from the OLS regression without the dummies. The results are the following:

Graph 1: The elasticity of fund raising capacity over time.



Source: Made by the author.

Generally, the prediction of the elasticity of fund raising capacity (left axis) is the same described in section 2. Countries can increase their debt levels (right axis) by accepting higher yields on the primary market long run debt securities. What is interesting is that before great turmoil periods, France had a much more extended condition to increase cheaper debt than its European neighbors. Moreover, the French and Italian elasticity outcomes are often the most attractive investment opportunities in relatively mild periods and before recessions.

²⁷ It is important to consider that Portugal, Italy and Greece sovereign debts were downgraded by rating agencies recently.

²⁸ The result of the linear computation of the MFRC is a constant.

These values show that poorer and indebted economies have much smaller capacity to attract demand towards their obligations when difficult times arise. Additionally, Greece and Portugal, which are relatively poor economies of the EMU, have to buoyantly boost their premiums over Germany in order to sustain higher budget deficits. Although their nominal deficits were not computed, it is possible to observe from the theoretical equations (9) and (12) that the quality of their expenditures deteriorates as they try to maintain similar elasticity levels from other economies of the Euro Area. As a result, a significant proportion of their anti-crises deficits become payment of interest on past debt, which is assuredly unhelpful for economies that are already entering in recession.

4.4. Verification of the Robustness of the Yield Premium

Up to now, the empirical testing was very minimalistic and considered only the explanatory variable. The study of public finance is in reality much more dynamic than the analysis of the risk premium of debt securities. Furthermore, section 2 indicates some other variables that are impacted by increases in government expenditure other than the risk premium. It shows that the current account, GDP, interest rates are impacted with increases in government expenditures²⁹. Moreover, the AS-AD model shows that inflation and the output gap are also impacted for the same reason.

In order to check the significance of the premium when we take these variables into account, the model was rebuilt in two different ways. The first way was running the same OLS as before including the output gap, inflation, current account, and the other component of interest rates. The interest rate is henceforth divided in two parts: the risk premium and the risk-free yield (keeping the German 10-yr yield as our usual benchmark).

Although useful to check the robustness of the risk premium variable and omitted variable bias, it is a bit naïve to consider that these variables are all exogenous with respect to debt. Governments, for instance, may decide to implement only countercyclical policy and automatic stabilizers may also influence the premium endogenously. Additionally, the premium of a country also depends on the economic situation and market credibility. Thus, it is reasonable to consider the premium endogenous when financial institutions decide to buy bonds from a member economy. The TSLS is a more attractive estimation method than the OLS. Hence, the same complete model proposed for the OLS estimation can be transformed in a TSLS using the premium as endogenous and all other variables mentioned as exogenous.

The relationship between the endogenous variable debt and the instruments is inverted when we consider the IS-LM-BP as our core theoretical model. However, this setting is just important to understand the interplay of the “exogenous” variables and the endogenous ones. The estimations can be summarized as following for the Euro Zone:

²⁹ Other variables, such investments, are also impacted; however, these impacts are disregarded as we focus our analysis in the government sector.

Table 10: Further regression results

Dependent Variable: DEBTEUROZONE

Method: **Ordinary Least Squares**

Sample: 2000:01 2010:02

Included observations: 122

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YLDP	0.029337	0.009768	3.003392	0.0033
YLDGERMANY	-0.007556	0.001542	-4.899399	0.0000
YGAP_EZ	-5.535104	0.921957	-6.003646	0.0000
CURRENTACC	-1.413824	0.260539	-5.426535	0.0000
INFLATION	-2.747411	0.179092	-15.34080	0.0000
SUBPRIME	-1.640364	0.216776	-7.567091	0.0000
GREEKCRISIS	1.406215	0.534080	2.632968	0.0096
C	78.60911	0.869293	90.42875	0.0000
R-squared	0.926960	F-Statistic		0.0000
Adjusted R-squared	0.922475			

Dependent Variable: DEBTEUROZONE

Method: **Two-Stage Least Squares**

Sample: 2000:01 2010:02

Included observations: 122

Instrument list: YLDGERMANY SUBPRIME GREEKCRISIS CURRENTACC INFLATION
YGAP_EZ

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YLDP	0.028073	0.009776	2.871730	0.0049
YGAP_EZ	-5.604197	0.922238	-6.076738	0.0000
YLDGERMANY	-0.007553	0.001542	-4.897065	0.0000
INFLATION	-2.739862	0.179118	-15.29641	0.0000
CURRENTACC	-1.440870	0.260673	-5.527491	0.0000
SUBPRIME	-1.629728	0.216813	-7.516728	0.0000
GREEKCRISIS	1.418184	0.534130	2.655129	0.0091
C	78.62036	0.869363	90.43443	0.0000
R-squared	0.926949	F-Statistic		0.0000
Adjusted R-squared	0.922463	Hausman test p-value		0.2846

Source: Made by the author.

As predicted by standard macroeconomic theory, all instruments were significant and have parameters that are compatible with reality. The only special cases are the risk-free yield and the yield premium. Both remained significant. The risk-free yield shows a significant negative impact on debt, which reinforces the hypothesis of potential competition between bonds available in the Euro Zone economies and the fact that they are substitute goods. Although the yield premium is still significant, its impact on debt is smaller than predicted before.

The Hausman test indicates that the indirect relation that the instruments cause on the minimalistic initial regression is not significant. This is not very accurate if we consider that markets do take into account the economic situation of the economies when lending money to the government.

Moreover, we may also observe the predominance of expansionary fiscal policy implementation when the output gap is negative. This countercyclical feature is explained by the automatic stabilizers and, possibly, discretionary actions taken by the member governments. However, it is impossible to distinguish which one prevails over the other directly. The large standard error in the

output gap parameter reinforces the fact that deficit fluctuations are not at all symmetric for the economies when we take into account the two components of the debt together. This remark is complementary to the correlation tables presented earlier.

5. Summary and Concluding Remarks

Analyzing the results of economic policy in the Euro Area is not an easy task. There is a strong lack of structural coordination between the actions implemented between the ECB and those of governments.

Fiscal policy and policy mix implementation are subject to severe legal constraints imposed by the SGP. Although the pact establishes homogeneous rules that delimit the budget deficit and debt of the member economies, it does not take into account the complex economic differences, such as fund raising capacity, of the EMU members. The current legislation is unfavorable to economies that are poorer and have high levels of accumulated debt. It is acceptable that the latter should suffer penalties for carrying excessive debt yet there is no reason why poorer economies with lower levels of debt should be penalized in an unfair manner by both legislation and, consequently, the financial markets.

Fiscal policy implementation is the only natural defense against recessions that EMU economies have at hand in recessionary times. There is clear disparity and complexity in its efficiency because of asymmetric shocks and divergent policy goals. Moreover, fiscal policy spillovers may generate political externalities that create divergence and conflicts between the countries in the group. These are some of the reasons that explain why fiscal profligacy rules over the current regulations of the Euro Area.

In most cases, the critiques to the SGP are complementary. The underlying logic of the pact has strong fundamentals; however, reforms, such as the ones proposed by Annett, Decressin, and Deppler (2005, p.23) are required:

“Stronger fiscal policies are an essential element of such a reform strategy and the SGP should play a central role. To that effect the fiscal framework should remain focused on the goal of eliminating politically-motivated deficit biases and other aspects of time-inconsistent fiscal policy. Theory provides a strong rationale for a fiscal framework such as the SGP, which boasts many of the characteristics of a model fiscal rule and serves as a useful external anchor, particularly for the smaller, more open, economies. But the legacy of time inconsistent policies lingers—many countries are far from underlying balance, do not take the fiscal plans underpinning Stability Programs seriously enough, keep seeking new ways to meet numerical targets without undertaking real adjustment, and are increasingly likely to become entangled in the EDP. Clearly, reforms are needed. But reforms should be sure to tackle the underlying deficiencies in the Pact—namely inadequate enforcement, ownership, and, to a lesser extent, flexibility—without diluting its time-consistent elements”.

Buti *et al.* (2003) propose a wide variety of measures designed to deliver a more pragmatic interpretation of the current legislation regarding fiscal policy. These authors suggest an adjustment of the enforcement rules of the Maastricht Treaty and the SGP on a country-by-country basis to take better account of public debt and sustainability more generally; improving transparency by distinguishing between long-lasting and one-off measures; monitoring cash flows and reporting contingent liabilities; devising a sanction for member states not undertaking sufficient consolidation during economic upturns; and making implementation of the rules less partisan by strengthening the role of the Commission in assessing compliance with the rules and in the application of sanctions.

The creation of the Eurostat was a strong implement to satisfy Buti's suggestions by standardizing sovereign transparency and accountability. However, much more needs to be done to individualize deficit enforcement procedures and free fiscal policy from political biases and economic asymmetries. It would be necessary to centralize certain functions that are currently in the hands of the governments to the EMU level. Among those, primary debt issuance and part of tax revenues, which are highly related to fiscal policy, should be priorities. This proposition is not at all original among economists. Blinder (1997), Fatás (2003) Begg et al.(2002), and Wiplozs (2005) have already proposed

centralized independent institutions, analogous to a Central Bank, to coordinate and implement some economic functions that are currently performed by the governments. All these authors propose institutions responsible for enforcing sustainability in public finance at country level. Wiploz calls them “Fiscal Policy Committees.”

This institution would not solve all the problems but it would help to free fiscal policy from political biases as well as prevent free rider problems and some of the negative fiscal policy spillovers on member economies. A stronger debt issuer would certainly help allocate debt more optimally and equally facilitating responsiveness to asymmetrical shocks more equally and coordinately. Moreover, a partially centralized taxation would help to ensure the capacity of the “Fiscal Policy Committees” to honor its debts. A cooperative policy-making body can be useful to integrate the BCE reaction function into the budgetary plans of the member economies. Allsopp (2002, *apud*, HM treasury staff paper, 2005, p.23) argues that a key requirement for effective policy co-ordination is an “appropriate and transparent monetary policy reaction function.” This gives national fiscal authorities a better understanding of how monetary policy would respond to economic fluctuations. Transparency and centralization on the budgetary side also enhances soundness of monetary policy effectiveness.

Rogoff & Reinhart (2009) showed that large financial crises are typically followed by sovereign default. The euro and the common-currency area have been attacked on a smaller scale but with wide repercussions throughout the media. Large economies, such as France and Germany would not be attacked as easily as Greece and Portugal were. A centralized debt market would improve the debt quality of the majority of member countries and reduce risk of indirect speculative attacks on the euro and in member economies with high levels short-term debt.

There are, however, difficulties in implementing this solution. One of them is the quantitative reduction of the fund raising capacity, dictated by the risk premium, in some Euro Zone economies such as France, when compared to the weighted average of the group. These economies may become reluctant to cooperate with this solution. The qualitative advantages presented would presumably increase the value of the premium. However, these shadow benefits cannot be easily measured.

Alternative short-term solutions, such as the creation of the European Monetary Fund suggested by Gros and Mayer and the aid packages given to Greece and other troubled members are also valid. They may ensure the economic stability of member economies at a given point of time. Despite this fact, they cannot solve the structural fiscal inefficiency that certain countries still maintain.

Acknowledgement

I have benefited from many useful comments and suggestions. I acknowledge with thanks the useful comments received from Fabrizio Coricelli, Boris Najman, James L. Grant, Maria Kuecken, and Luis Ortiz.

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