

The estimation of the fiscal policy responsibility in the occurrence of the debt crisis in the euro area

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Abstract— The economic crisis that has affected the euro area since 2008 has rapidly turned into a crisis of government debt, which could jeopardize the sustainability of European Monetary Union. One of the factors that increased the problems of debt financing was inadequate fiscal policy promoted in the previous years. Within this study, we have used the reaction function model of the fiscal policy, in order to analyze the behaviour of the governments in the most vulnerable five members of the euro area – Ireland, Greece, Spain, Portugal, Italy. The stance of the fiscal policy was made with the structural budget balance, variable showing the discretionary intervention of the government to the budget. The results obtained in this study show that the governments of the five economies have promoted pro-cyclical fiscal policies during 1990-2009, that have worsened the budget deficit in periods of economic expansion. Thus, at one percent inflationary gap, the governments of these countries have not responded by promoting a restrictive fiscal policy (ie anti-cyclical), but an expansive ones. In these circumstances, the economic recession has increased their budget deficits recorded periods of economic expansion, increasing the stock of public debt.

Key words: public debt; euro area; fiscal policy; structural budget balance

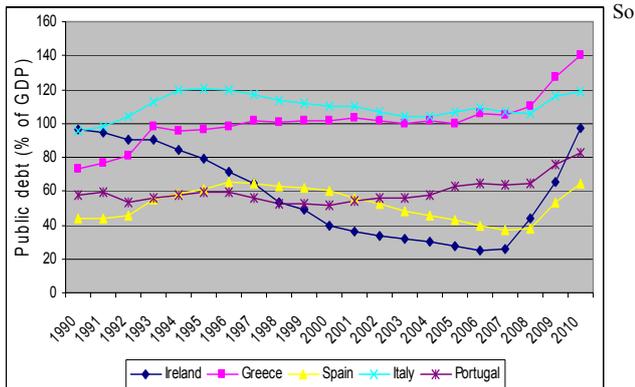
I. INTRODUCTION

The origins of the sovereign debt crisis in the euro area can be traced to pro-cyclical fiscal policies during the boom period preceding the economic and financial crisis. Theoretically, euro area member states are required by the Treaty to ensure that their government deficits do not exceed 3% of GDP and that their debt levels should be declining to below 60%. The instrument which had to ensure coordination and stability of public finances in the euro area (Growth and Stability Pact) was not effective in preventing

the debt crisis of the Member States. It became more vulnerable in 2005, when Member States were allowed to extend the period of time that could reduce the budget deficit below 3% of GDP. This shows that European monetary union does not have a specific institutional arrangement of optimal currency areas. Euro area is not a fiscal or political union, so it did not have an automatic mechanism to support the economies with problems in debt financing.

Among euro area countries, the most vulnerable economies in terms of sustainability of public finances are Greece, Italy, Portugal, Ireland and Spain. They produce 35% of euro area GDP, 40% of total public debt and 48% of total budget deficit. The problems which these economies have on deficit financing could have a spillover effect on other states, because the bank exposure of the important economies from euro area (Germany and France) in the five economies is 21% and 37% of GDP.

Greece and Italy were characterized before the economic crisis by a public debt level at least 100% of GDP, well above the level established by the Treaty of Maastricht (Fig. 1). Also, their budget deficits have exceeded 3% of GDP in most years included in the analyzed period (1990-2009), even if they have been in a period of economic expansion. For example, Greece had an average deficit of 5.3% of GDP between 2002 and 2008, although the economy was characterized by an inflationary gap at least 1% of GDP each year.



Source of data: European Commission, 2010

Figure 1. The evolution of the public debt

Portugal registered a public debt level of 64% of GDP in 2008, with 15 percentage points more than when adopted the single currency. This increase was the result of budget deficits of at least 2.7% of GDP in each year of analysis and of low economic growth rates that induced a snowball-effect on the public debt. Current unfavorable situation of public finances in Ireland and Spain is due to a lesser extent to fiscal policies promoted before the economic crisis. Compared to 2000, their debt was adjusted by approximately 27 percentage points to 32% of GDP, 37% of GDP respectively. The economic crisis that has affected these two economies has generated the collapse of the housing sector, losses for financial sector and a significant reduction of the budgetary revenue. Thus, Ireland's budget deficit was about 14.5% of GDP in 2009, while that of Spain was 11.2% of GDP. The deterioration in the public finances is due rather to both the operation of the automatic stabilizers and the measures implemented by governments to support both aggregate demand and the financial sector.

Therefore, the current financial difficulties of Ireland and Spain are generated largely by negative impact on the economy falling revenues and state intervention to support the private sector, including banking sector. Before the economic crisis, these economies have recorded the largest reductions in public debt to GDP, but also the greatest increase in private debt to GDP. The adjustment of private debt as a result of the financial crisis turned into a public debt growth. In addition prolonged periods of expansion and the emergence of speculative bubbles are more influenced by private credit growth and the role of governments in regulating the situation is less significant. In this case, probably should increase the involvement of the European Central Bank to ensure financial stability in the euro area.

The impact of economic downturn on public finances is reflected in the stock of public debt growth rate in the last 2-3 years. Since 2007, the public debt increase by 70% of GDP in Ireland and by 35% of GDP in Greece. Even if the two economies are similar in rapid deterioration of finances, however, the fiscal policies pursued were different in the period preceding the crisis.

In this study we identified the stance of fiscal policy in the cases of Greece and Ireland using changes in structural

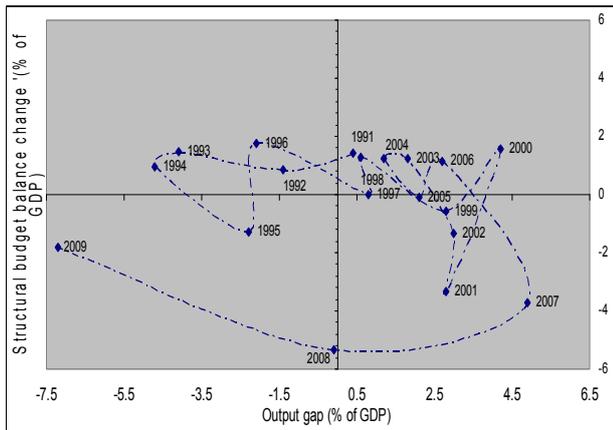
budget balance, variable which we will also use in the next section. This variable is calculated by subtracting the cyclical component of budget balance from the effective budget balance. The increase of the structural balance corresponds to a restrictive fiscal policy and its decrease to expansionary fiscal policy one. If the structural balance will increase when the output gap is positive then fiscal policy becomes anti-cyclical. This is pro-cyclical if the output gap of economy is negative, ie there is a recessionary gap. The relationship between changes in structural budget balance and output gap is shown in the table below.

TABLE I THE RELATIONSHIP BETWEEN STRUCTURAL BUDGET AND OUTPUT GAP

Structural budget balance change	Output-gap	
	Negative (recessionary gap)	Positive (inflationary gap)
Positive	Restrictive (pro-cyclical) fiscal policy	Restrictive (anti-cyclical) fiscal policy
Negative	Expansive (anti-cyclical) fiscal policy	Expansive (pro-cyclical) fiscal policy

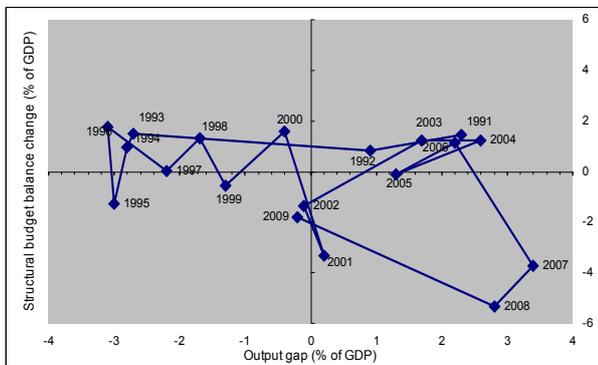
Greece has promoted a slightly restrictive fiscal policy during 1992-1994, ie 2003-2006 and an expansionary in 2001, 2002, 2007 and 2008 (Fig 2). Since 1997 the economy was registered an inflationary gap, which led to overheating of the economy between 2003-2007 years. The average rate of growth was about 4.2%, twice higher than the Eurozone average, but the process of fiscal consolidation had a low intensity. Thus, the structural budget balance deficit increased to 3.1% of GDP in 1997 to 8.9% of GDP in 2004 and 5.3% of GDP in 2007.

Ireland was registered during 15 years (1987-2002) an average growth rate of about 8% annually, which was accompanied by a process of consolidation of public finance public by expenditure side. These were reduced by 12 percentage points of GDP in 2005 compared to 1992, reaching the lowest level in the EU. Before adopting the euro currency, Ireland has promoted a restrictive and pro-cyclical fiscal policy, which is reflected in increasing the structural budget balance from a deficit of 2% of GDP in 1992 to a surplus of 2.2% of GDP in 1998 (Fig 3).



Source of data: European Commission, 2010

Figure 2. The fiscal policy stance in Greece



Source of data: European Commission, 2010

Figure 3. The fiscal policy stance in Ireland

Even if economic evolution after 2000 year was similar to that of Greece, however, the fiscal policy in Ireland was anti-cyclical, which allowed recording of budget surpluses and reducing public debt to GDP ratio. Despite the adoption of appropriate fiscal policies, economic crisis has resulted in significant budgetary losses in Ireland, which led to a public debt level of 97% of GDP in 2010, over 1990 level. In other words, the gains made in the budget for the period 1987-2007 have been removed in just three years, because of the housing sector collapse and of the banking sector losses.

II. ESTIMATION METHOD

For the purpose of estimating the behavior of the governments in the five countries, we have used a panel method based to the fiscal policy's reaction function. The temporal dimension of the panel is 20 years (1990-2009), this period outlining the evolution of the fiscal policies under the terms of adopting the Maastricht Treaty, elaborating the Stability and Growth pact, creating of the Economic and monetary Union and introducing of the Euro currency.

Because the panel has a smaller number of entities than the length of the period, we used an estimator LSDV type (least squares dummy variable). Its usage has been

influenced by the results of the previous estimates (Judson and Owen, 1999; Bruno, 2005), which demonstrated the superiority of the estimator LSDV with reference to the estimator GMM within panels which have low dimensions (of the included entities), as it is the case of this study.

The proposed methodology has been also used in other studies that have examined the stance of fiscal policy. Recently, Balassone et al. (2009) showed that, during the period between 1970 and 2007, the EU-15 members was recorded an asymmetrical response of the budget balance to the economy's cyclic evolution, which was especially induced by the discretionary fiscal measures, from the point of view of the public spending. According to the authors, the fiscal rules introduced by the Maastricht Treaty and by Stability and Growth Pact did not influence the governments' behaviour relating to increase the long-term sustainability of public finance. The cyclic asymmetry of the fiscal policy (its pro-cyclic stance) induced the increase of the budget deficit (with almost 0.4% of the GDP each year) and the significant increase of the public debt.

The model of fiscal policy reaction function includes as endogenous variable the variation of the structural budget balance. According to economic literature, this variable represents the most appropriate indicator of government behaviour, because it excludes the influence of business cycle phase on the state budget. It is calculated as difference between the effective and cyclically budgetary balance. The exogenous variables of the model are structural budget balance lagged with a period (as an expression of dynamic panel), output gap and public debt. To all these, we added two dummy variables, in order to identify the impact of creating the Economic and Monetary Union and of the existence of an excessive budget deficit upon the behaviour of the euro area governments. Thus, the *dummy emu* variable takes the value 1 for each year during the period between 1999 and 2009, corresponding to the creation of the Eurozone. The *dummy excessive deficit* variable takes the value 1 for each year when the budget deficit exceeded 3% of the GDP (beginning with 1993, subsequent to adopting the Maastricht Treaty) and the value 0 otherwise.

Moreover, in order to investigate the asymmetric nature of the discretionary fiscal policy, we made a splitting of the output gap into two data series, one of them including the inflationary gap, and the other one including the recessionary gap.

The source of the data used within the dynamic panel is the European Commission database „Cyclical adjustment of budget balances” (the version from the autumn of 2010). The used data series are expressed in percentage of the actual GDP. The used dynamic panel is a LSDV type (least squares with dummy variable) including fixed effects, of which general form is as it follows:

$$Y_{i,t} = \alpha \cdot Y_{i,t-1} + \beta \cdot X_{i,t(t-1)} + \mu_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where, $i = 1, \dots, 5$ (countries included in the panel); $t = 1990, \dots, 2009$;

X_{it} represents a vector of exogenous variables of the form $(K-1) \times 1$;

μ_i – fixed effects (specific to the countries included in the analysis and to the period); ε_{it} – the regression error, independent and normally distributed with zero average and variance σ_ε^2 ($\varepsilon_{it} \sim \text{IID}(0; \sigma_\varepsilon^2)$), reflecting the homoskedasticity.

The model used in this study has the form described by the following equation:

$$\Delta SBB_{i,t} = \beta_0 \cdot \Delta SBB_{i,t-1} + \beta_1 \cdot Pdebt_{i,t-1} + \beta_2 \cdot OG_{i,t(t-1)} + \mu_{i,t} + \varepsilon_{i,t} \quad (2)$$

where,

SBB is structural budget balance (as percentage of GDP)

ΔSBB – absolute change of the structural budget balance

P_{debt} – the public debt to GDP ratio

OG – output gap (difference between actual and potential GDP, expressed as percentage of GDP)

The coefficient β_0 reflects the degree of persistence of fiscal policy promoted and must be negative to ensure the model stability. Thus, a decrease of the structural budget balance during the year $t-1$ (an expansionary fiscal policy which generates the increase of the budget deficit) should be followed by an increase of the budget balance during the year t (a restrictive fiscal policy which decreases the previously deficit). The coefficient β_1 reflects the sustainability condition of the public debt. If it has a positive value then the government responds by strengthening the fiscal policy (the increase of the SBB), when the economy has previously recorded an increase of the public debt. The coefficient β_2 emphasizes the pro-cyclical or anti-cyclical stance of the fiscal policy. If this coefficient is positive, then fiscal policy is *anti-cyclical* (the government promotes an expansionary fiscal policy if the economy is in recession). If it is negative, then the fiscal policy is *pro-cyclical*, and if it is statistically insignificant, then the fiscal policy is *neutral* (i.e. it does not respond) to the business cycle phases.

III. THE ESTIMATION RESULTS

In order to estimate the model described in the previous section, we have used Eviews econometric software, version 7. According to this model the fiscal policy promoted by the group of the five countries was pro-cyclic during the period between 1990 and 2009, as Table II shows. Thus, one percentage of GDP expansionary gap lead to decrease of the structural budget balance with 0.31% of the GDP. The sensitivity of the structural budget balance according to the output gap decreased (in absolute values) from -0.63 (between 1990 and 1999) to -0.20, between 2000 and 2009, highlighting the decrease of the pro-cyclical governments behaviour, since creation of European monetary union.

Beginning with 2001-2002, the economic growth slowed down in three of the countries (except Greece and Ireland), and this reflected in a lower or even negative output gap (i.e. economic recession). The situation reversed between 2005 and the beginning of the economic crisis, period during which the promoted fiscal policy was rather expansionary and pro-cyclical, thus contributing to the deterioration of the structural budget balance.

The estimated model meets the stability condition of the public finances, because the coefficient β_0 is negative. Thus the years when the government promotes an increase of the public spending were followed by other periods when the

governments were more restrictively. If the structural budget balance increase with 1% of the GDP during the year $t-1$ compared to $t-2$, then SBB decreased during the year t with 0.31-0.32 % of the GDP compared to $t-1$. A higher share of the debt results in the increase of the costs with the interests and in the deterioration of the budget balance, so that restrictive fiscal measures are necessary during the next period, which could balance the previous effect.

According to the coefficient β_1 the lagged variable of the public debt is uncorrelated with the endogenous variable. It results that is invalidated the sustainability condition of the public debt in situation of the five governments included in model.

The influence of the dummy *excessive deficit* variable is significant, reflecting the negative impact upon the structural budget balance, which decreased with 1.39 % of GDP (first version of the model) during the years when the budget deficit was recorded as 3% of the GDP. Once the Economic and Monetary union was created, the structural budget balance got worse during the years with an excessive budget deficit, namely with 1.51% of the GDP (this aspect being illustrated by the dummy *emu*dummy excessive deficit* in the second version of the model). In fact three of the five countries (Greece, Italy, Portugal) recorded excessive deficits after 2000, which they decreased only after at least two years.

The two versions of the structural budget balance model satisfy the condition of lack of correlation between estimation errors. To prove this, we made a regression model of the residual depending on its lags. The null hypothesis of uncorrelated errors is satisfied in the first case with a probability of 93% and in the second case with a probability of 92%.

TABLE II THE ESTIMATIONS OF THE STRUCTURAL BUDGET BALANCE MODEL

ΔSBB – dependent variable		
	1 st version	2 nd version
constant	0.82	-1.01
$\Delta SBB(-1)$	-0.31**	-0.32**
Standard error	0.13	0.13
$Pdebt(-1)$	0.00	0.01
Standard error	0.00	0.01
OG	-0.20***	-0.22***
Standard error	0.07	0.06
Dummy <i>excessive deficit</i>	-1.39***	-
Standard error	0.28	-
Dummy <i>emu*Dummy excessive deficit</i>	-	-1.51***
Standard error		0.32
R ²	0.59	0.62
No. of observations	90	90
Autocorrelation of errors (p value)	0.93	0.92

Note: ***, **, * Statistically significant at 1%, 5%, respectively 10%.
Source: Author's estimations in Eviews 7

IV. CONCLUSIONS

Under the terms of the actual crisis, the fiscal policy is considered to be the only macroeconomic policy which can

stimulate the economic recovery. But the five economies included in this analysis cannot promote an anti-cyclical fiscal policy, although recorded a significant decline of the GDP. Governments have a limited ability to intervene at least for three reasons. Firstly, the amplitude of the economic decrease was high, involving a sudden depreciation of the budget balance also because of the automatic stabilizers' action. Secondly, the public debt's share in the GDP is quite high, the rhythm of its adjustment being slowed down after adopting the Euro currency in Greece, Italy and Portugal. Thirdly, the effort made for the budget adjustment was quite low during the three years which preceded the economic crisis (2005-2008), although the economic situation was more favorable.

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