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# Automatic stabilizers vs. discretionary fiscal policy in Euro area countries

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**Within this study, we have used the reaction function model of the fiscal policy to study the behaviour of the governments in the Eurozone's countries. The analysis methodology was that of the dynamic panel, in which we have included the first twelve countries of the Eurozone. The studied period was 1990 to 2009, and the used data series were those of the European Commission (2009). The estimates made on the basis of three models have proved the promotion of an anti-cyclic discretionary fiscal policy, which is symmetrical enough, depending on the phases of the business cycle. Moreover, a level of the automatic stabilizers has also resulted (measured by means of the cyclical budget balance), which is very close to the conventional one that is mentioned in the economic literature. Although the fiscal policy within the Eurozone stabilized the output gaps during the analyzed period, the current manoeuvre limits are quite low.**

**Key words:** Automatic stabilizers, structural budget balance, discretionary fiscal policy, output gap, euro area.

## INTRODUCTION

The current economic and financial crisis has emphasized the potential anti-cyclic role of the fiscal policy, under the terms in which the monetary policy's transmission in the real economy is very limited (notwithstanding the decrease of the interest charge). Moreover, the fiscal manoeuvre limit is exhaustible, under the terms in which the budget deficits (which automatically increased during recession periods) continued during expansion years, thus increasing the public debt's share in the GDP. As for the stabilizing role of the fiscal policy, we may consider that it should not be pro-cyclic, that is, the budget balance should not get worse during the economic expansion periods, but should be improved during the economic recession periods. Under the terms of a pro-cyclic fiscal policy, the economy will get overheated during the economic expansion periods, thus affecting the management of the monetary policy. It is not an accident that the instrument of stability and growth pact was created within the Eurozone, due to the fact that its role is to contribute to maintaining the prices' stability (the target assumed by the European Central Bank), by

promoting anti-cyclic fiscal policies.

When analyzing the cyclic behaviour of the fiscal policy, we should underline the fact that the modification of the budget balance constitutes the effect of actions performed by both the automatic stabilizers and the discretionary fiscal policy as well. The higher the influence of the automatic stabilizers, the lesser the economy stimulus packages should be adopted by an economy which is currently affected by the economic and financial crisis, that is, a discretionary fiscal policy.

Methodologically, the fluctuation of the budget balance constitutes the effect of three elements:

(a) The automatic stabilizers which have two significances. One of them refers to the traditional macroeconomic theory, and the second one is being included in the latest approaches regarding the business cycles. The first significance correlates to the modifications settled by law of the budget expenses and of the budget revenues with the phases of the business cycle, in that they have a contra-cyclic impact upon the economy. For example, the progressive taxation constitutes an automatic stabilizer of the economy, as it allows the lowering of the expansion (by the automatic decrease of the available revenues, as a result of their belonging to a higher taxation tranche). The second approach catches the automatic impact of the business cycle's phases upon the components of the

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budget revenues and expenses, being reflected in the cyclic component of the budget balance. For example, approximately 90% of the budget revenues automatically respond to the economy's cyclic situation (the returns from direct and indirect taxes and contributions decreased during the recession periods) and only 5% of the budget expenses (especially those for unemployment, which automatically increased during expansion periods). As a consequence, a cyclic budget excess will be recorded during expansion periods, and a cyclic budget deficit will be recorded during the recession periods.

(b) The endogenous discretionary fiscal policy which includes its response to the economy's cyclic evolutions at present or those which are anticipated on a short term. In order to identify the discretionary characteristic of the fiscal policy, we should calculate the structural component of the budget balance (excluding the automatic stabilizers' influence from the budget balance, that is, the cyclic component) and its variation constituting an indicator of the endogenous discretionary fiscal policy's nature.

(c) The exogenous discretionary fiscal policy which includes modifications of the fiscal instruments, irrespective of the current economic conditions. Examples for this are constituted by the variations in taxation, which are determined by the elections, the population's aging and the need to finance the defense budget (like in the case of the NATO member countries).

However, the isolation of the budget balance variation from the three components is more difficult, conceptually speaking. For example, a government which encounters a level of the budget balance which exceeds 3% will not propose to significantly decrease it during a period of economic recession, but will wait until the economy become healthy again. Thus, the budget balance will get decreased when the economy is expansionary, and the taxation policy will be endogenous and anti-cyclical, even though the government has not reacted to stabilize that stage of the business cycle. Thus, an exogenous measure of the fiscal policy will be the characteristic of an endogenous measure. Considering the difficulty to conceptually identify the three components, we may proceed to econometrically estimate some reaction functions of the fiscal policy (under a simplified form), such as the ones which have been outlined in Equations (1), (2) and (3):

$$\Delta BB_t = \alpha_1 + \beta_1 OG_t + \varepsilon_t \quad (1)$$

$$\Delta SBB_t = \alpha_2 + \beta_2 \cdot OG_t + \varepsilon_t \quad (2)$$

$$\Delta CBB_t = \alpha_3 + \beta_3 \cdot OG_t + \varepsilon_t \quad (3)$$

Where BB represents the (effective) budget balance and SBB represents the structural budget balance or cyclically-adjusted budget balance, calculated as the difference between the effective budget balance and the cyclical budget balance of the CBB.

In Equation (1), the coefficient  $\beta_1$  represents both the automatic stabilizers' influences and those of the endogenous discretionary fiscal policy (reflected by the variation in the budget balance), depending on the output gap (OG in the equations). In Equation (2), the variation of SBB constitutes the expression of the fiscal policy's discretionarism, and the coefficient  $\beta_2$  reflects the fiscal policy's endogenous reaction to the cyclic conditions existing in the economy. In Equation (3), the coefficient  $\beta_3$  outlines the variation of CBB depending on the business cycle, namely the automatic stabilizers' influence. To a certain extent, the endogenous discretionary fiscal policy is reflected by the residues of regressions (1) and (2). The coefficient  $\beta_3$  will be approximately equal to the difference between coefficients  $\beta_1$  and  $\beta_2$ . In case these coefficients are not statistically significant, we may then consider that the promoted fiscal policy is neutral, that is, it does not react according to the stages of the business cycle.

## THE PROPOSED ANALYSIS' RELEVANCE WITHIN THE ECONOMIC LITERATURE

The economic literature showed that the fiscal variables have the tendency to respond asymmetrically to the cyclic conditions within the economy, depending on the recorded recessionary and expansionary gaps (Van den Noord, 2000). Moreover, it has been noticed that, during the period between 1970 and 2000, the EU countries recorded increasing budget deficits during the recession periods, which has not decreased during the economic expansion periods. The budget's response to the evolution of the economic activity has been neutralized by the tendency to increase the budget expenses, especially the social transfers. Moreover, the pro-cyclicality tendency of the fiscal policy during the expansion periods has also been identified in the cases of the emerging countries. Thus, Buti and Sapir (1998) confirmed the previous statements, though showing that the budget balance got improved only under the term of a higher inflationary gap. Buti et al. (1998) estimated that, for the UE countries which are characterized by high levels of public debt during the period between 1970 and 1990, the budget deficit was approximately 6% during the periods when the economy was produced at a level which was close and superior to the potential GDP, while it increased with almost two percents when the output gap was recessionary. The same asymmetry of the fiscal policy was also identified by Balassone and Francese (2004) for 16 OECD countries during the period between 1969 and 2002. Talvi and Vegh (2000) and Kumar and Ter-Minassian (2007) confirmed the results obtained by Gavin and Perotti (1997), showing that the fiscal rule of the developing economies is to promote expansionary policies during favourable periods of the economy and restrictive policies during the recession periods.

Cimadomo (2008) showed that the fiscal policies were rather procyclic (when using ex-post statistical data) and anti-cyclic (when using ex-ante data, or data expressed in real time, prior to taking fiscal policy decisions), if considering the OECD countries (between 1994 and 2006). Colinelly and Momigliano (2008) showed that, in the case of the EU-15 countries, a weakly anti-cyclic fiscal policy and a neutral one was developed (in the case of using some data series in real time) under the terms of some ex-post data. Based on a dynamic panel in which 14 EU countries were included, Balassone et al. (2009) showed that, during the period between 1970 and 2007, an asymmetrical response of the budget balance to the economy's cyclic evolution was recorded, which was especially induced by the discretionary fiscal measures, from the point of view of the public expenses. According to the authors, the fiscal rules introduced by the Maastricht Treaty did not influence the governments' behaviour with reference to their capacity to stabilize the economy through fiscal policy. The cyclic asymmetry of the fiscal policy (its pro-cyclic nature) induced the increase of the budget deficit (with almost 0.4% of the GDP each year, related to the promotion of an anti-cyclic policy) and the significant increase of the public debt.

Manasse (2006) estimated that the fiscal policy would rather be neutral during the recession periods and procyclic during the expansion periods. Actually, most of the studies assert that introducing the European Union's taxation regulations has not resulted in the increase of the trend towards procyclicality (von Hagen and Wyplosz, 2008). According to IMF estimates (2005), an increase by 1% of the real GDP, if compared to the potential GDP, in the economically developed countries is accompanied by an increase of the budget deficit by 0.3%. On the contrary, Afonso and Hauptmeier (2009) showed that, in the case of the EU-27 countries, the arrangements which are specific to the European Union and to the stability and growth pact, recorded a significant statistic effect upon the improvement of the fiscal position, while national elections worsened the budget balance.

As for the identification of the proportions and intensity of the automatic stabilizers, most of the studies calculated the elasticity of various fiscal components, and also of the budget balance depending on the economy's cyclic fluctuations. Dolls et al. (2009) estimated that the automatic stabilizers eliminate 38% of a proportional shock of the revenues in EU, in comparison with 32% in USA. As a consequence, the results conform to the analysis performed by Mabbett and Schelkle (2007) for 15 countries in the European Union.

## ESTIMATION METHOD

For the purpose of estimating the behavior of the governments in the Euro area countries, we have used a few models with reference to the fiscal policy's reaction functions. Also, we have used the panel method, in which we introduced the twelve countries which have adopted the Euro currency since 2002. The temporal

dimension of the panel is 20 years (1990 to 2009), and this period outlines the evolution of the fiscal policies under the terms of adopting the Maastricht criteria (1993), elaborating the stability and growth pact (1997), creating the economic and monetary union (1999) and introducing the Euro currency (2002). In case a panel has a decreased number of entities corresponding to the length of the period, it is important to choose the optimum method so that we could estimate the nature of the fiscal policy.

The economic literature outlines two options with reference to applying valid econometric methods (with consistent and unbiased estimators) for the research of a static or dynamic panel, where estimator LSDV (including dummy variables when applying the method of least squares) and estimator GMM (generalized method of moments) are used. As for a static panel (of which variables do not include the explanatory ones and the delayed values of the dependent variable), the presence of efficient estimators has been obtained by applying a procedure based on fixed effects, namely LSDV. If this method was used for the dynamic panels (which also include the delayed dependant variable) for a shorter period referring to the number of the included entities, then biased estimators may occur as a result of the correlation between the errors of the regression and the previous values of the dependant variable. In the economic literature, this bias is named "Nickell-bias" (Nickell, 1979). In order to neutralize this deviation, the GMM method was proposed and was being developed by Arellano and Bond (1991). In the first stage, this procedure presumes that the gap of the dynamic equation will be estimated, in order to decrease the correlation between the delayed dependant variable and the estimation error. During the second stage, several orthogonality relations are used for deriving the estimators, and the second difference of the dependant variable will be used as an instrument. The required moment condition will be that the correlation degree between the errors' variation and the second difference of the dependant variable is zero.

Taking into consideration the methodological aspects which we have previously presented, we decided to analyze the reaction of the fiscal policy within the Euro area based on a dynamic panel, which was estimated according to estimator LSDV. Its usage has been influenced by the results of the previous estimates (Judson and Owen, 1999; Bruno, 2005), which demonstrated the superiority of estimator LSDV with reference to estimator GMM within panels which have low dimensions (of the included entities), as it is the case of this study.

## Methodology

The fiscal policy's behaviour according to the phases of the business cycle and its stabilizing impact are emphasized by means of the response functions. They measure, from an econometrical point of view, the nature of the fiscal policy in order to identify the factors which influence the government authorities' actions, such as the (previous) budget balance and the previous balance of the public debt and output gap. The basic model of the fiscal policy's response function has the following form:

$$BB_t = \alpha + a \cdot BB_{t-1} + b \cdot Pdebt_t + c \cdot OG_t + error \quad (4)$$

Where; BB represents the (actual) budget balance, Pdebt – the balance of the public debt, and OG – the output gap. However, all of them are expressed as a percentage of the actual GDP.

Within this study, we used three forms of the fiscal policy's response functions, the endogenous variable of each of them being the variation of the budget balance (actual, structural and cyclic). The variables of the basic model are the output gap (lagged with a period, in order to take into account the fiscal policy's transmission lag) and the balance of the public debt (also lagged with a period).

To all these, we added the endogenous variable which is lagged with a period (constituting the characteristic of a dynamic panel) and 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), also reflecting the influence of introducing the stability and growth pact after 1998. 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 for the remaining years.

Moreover, in order to investigate the asymmetric nature of the discretionary fiscal policy and of the automatic stabilizers, 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 database "Cyclical adjustment of budget balances" (the version from the spring of 2010), made by the Directorate General for Economic and Financial Affairs at the European Commission. The used data series are expressed in percentage of the actual GDP. The maximum number of observations within a data series is 240, while the analyzed period is 1991 to 2009, and the number of the countries which are included in the analysis is 12 (those which have passed through the nominal convergence process at the end of the 1990s). The used dynamic panel is a LSDV type (least squares with dummy variable) including fixed effects, of which the general form is as follows:

$$Y_{i,t} = \alpha \cdot Y_{i,t-1} + \beta \cdot X_{i,t(t-1)} + \mu_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where:  $i = 1, \dots, 12$  (countries included in the panel);  $t = 1990, \dots, 2009$ ,  $X_{it}$  represents a vector of exogenous regressors of the form  $(K-1) \times 1$ ,  $\mu_i$  – fixed effects (specific to the countries included in the analysis and in the period) and  $\varepsilon_{it}$  – the regression error, independent and normally distributed with zero average and variance  $\sigma_\varepsilon^2$  ( $\varepsilon_{it}$  IID (0;  $\sigma_\varepsilon^2$ )), reflecting the homoskedasticity.

$E(\varepsilon_{it}, \mu_i) = 0$  implies that the fixed effects and regression errors are not correlated

$E(\varepsilon_{it}, X_{it}) = 0$  means that the exogeneity of variable  $X$ , is not correlated with the regression error.

In order to identify the nature of the fiscal policy promoted within the Eurozone, the fiscal stability degree, the promoted fiscal behaviour's constancy and the fiscal discretionarism's degree, we used three models of the response functions, which have a form which is specific to a dynamic panel.

#### The model of the actual budget balance (BB)

$$\Delta BB_{i,t} = \alpha_0 \cdot \Delta BB_{i,t-1} + \alpha_1 \cdot Pdebt_{i,t-1} + \alpha_2 \cdot OG_{i,t(t-1)} + \mu_{i,t} + \varepsilon_{i,t} \quad (6)$$

The coefficient  $\alpha_0$  reflects the constancy degree of the promoted fiscal policy, emphasized by the variation of the actual budget balance. For the model to be stable, the coefficient  $\alpha_0$  should be negative; thus, a decrease of the budget balance during the year  $t-1$  (which generates the increase of the budget deficit) should be followed by an increase of the budget balance during year  $t$  (which decreases the previously accumulated deficit). The coefficient  $\alpha_1$  reflects the sustainability condition of the public debt's balance; thus, under the terms of a positive coefficient, the government

responds by strengthening the fiscal policy (the increase of the BB), when the economy has previously recorded an increase of the public debt.

The coefficient  $\alpha_2$  catches the fiscal policy's capacity to provide the stabilization of the previous cyclic fluctuations (OG); if this coefficient is positive, the fiscal policy may be considered *anti-cyclic* (under the terms of a negative output gap, the budget balance will get decreased, and this corresponds to an expansionary fiscal policy). If it is negative, then the fiscal policy is *pro-cyclic*, and if it is statistically insignificant, then the fiscal policy is *neutral* (that is, it does not respond to the economy's evolution). Moreover, the coefficient  $\alpha_2$  reflects both the action of the automatic stabilizers, and also that of the discretionary fiscal policy.

In order to identify the asymmetrical stance of the fiscal policy, according to the phases of the business cycle, we made an adjustment of the first model under the following form:

$$\Delta BB_{i,t} = \alpha_0 \cdot \Delta BB_{i,t-1} + \alpha_1 \cdot Pdebt_{i,t-1} + \alpha_2^P \cdot OG_{i,t(t-1)}^P + \alpha_2^N \cdot OG_{i,t(t-1)}^N + \mu_{i,t} + \varepsilon_{i,t} \quad (7)$$

Where;  $\alpha_2^P$  and  $\alpha_2^N$ , reflects the sensitivity of the fiscal policy (the variation of the BB) according to the inflationary gap ( $OG^P$ ) and the recessionary gap ( $OG^N$ ). The condition for an anti-cyclic fiscal policy is the same as it is for the coefficient  $\alpha_2$ , namely  $\alpha_2^P$  and  $\alpha_2^N$  should be positive.

The index of the fiscal policy's asymmetry ( $\varphi_{BB}$ ) will be calculated as the difference between sensitivities according to the economy's cyclic fluctuations:

$$\varphi_{BB} = \alpha_2^P - \alpha_2^N$$

If the index is zero, then the fiscal policy is symmetric according to the economy's cyclic evolution. If this index is positive, then the improvement of the budget balance during the economic expansion periods is higher than it worsening during the economic recession periods, and this will generate an increase of the actual budget balance.

#### The model of the structural budget balance (SBB) of the discretionary fiscal policy

$$\Delta SBB_{i,t} = \beta_0 \cdot \Delta SBB_{i,t-1} + \beta_1 \cdot Pdebt_{i,t-1} + \beta_2 \cdot OG_{i,t(t-1)} + \mu_{i,t} + \varepsilon_{i,t} \quad (8)$$

In this model, the dependent variable is the variation of the structural budget balance, considered to be a reflection of the discretionary degree of the fiscal policy. The significances of the coefficients  $\beta_0$ ,  $\beta_1$  and  $\beta_2$  are the same as those for the coefficients  $\alpha_0$ ,  $\alpha_1$  and  $\alpha_2$ , but we have to mention that  $\beta_2$  emphasizes the importance of promoting an anti-cyclic / pro-cyclic / neutral policy in that economy. Similarly, we may create the coefficient ( $\varphi_{SBB}$ ), as a measure of the discretionary fiscal policy's asymmetry.

#### The model of the structural budget balance (CBB) of the automatic stabilizers

$$CBB_{i,t} = \delta_0 \cdot CBB_{i,t-1} + \delta_2 \cdot OG_{i,t(t-1)} + \mu_{i,t} + \varepsilon_{i,t} \quad (9)$$

The dependent variable is the cyclical budget balance (and not the variation, as it is initially stationary), which outlines the automatic influence of the economy's cyclic fluctuations upon the national public budget. In order to emphasize the characteristics of this model, we have excluded the variable which refers to the public

**Table 1.** Results of applying the stationarity tests.

The probability associated to the tests*	BB	SBB	CBB	OG	Pdebt	OG <sup>P</sup>	OG <sup>N</sup>
LLC (t*)	0.4200	0.1093	0.0091	0.0812	0.0013	0.0000	0.4939
Breitung (t-stat)	0.9900	0.9742	0.0000	0.0000	0.9059	0.0000	0.0000
IPS (W-stat)	0.0268	0.0802	0.0000	0.0000	0.0726	0.0000	0.0017
Fisher-ADF (Chi <sup>2</sup> )	0.0839	0.1816	0.0000	0.0000	0.0229	0.0000	0.0082
Fisher-PP (Chi <sup>2</sup> )	0.1674	0.0532	0.0107	0.0010	0.3547	0.0016	0.1218

(\*) The probabilities associated to the Fischer tests were determined by using Chi square asymptotic distribution. The other ones were made by supposing a normal asymptotic distribution. The null hypothesis associated to the first two tests is that the common process has a unit root. The null hypothesis for the next three tests is that a combination of the individual processes has a unit root, under the terms in which certain countries may have a stationary root, and others may have a stationary process. The hypothesis is validated at 1, 5 and 10%, under the terms of a probability which is inferior to the previous percentages.

debt balance. In such a case, an asymmetry coefficient of the automatic stabilizers may be calculated ( $\phi_{CBB}$ ), and this coefficient catches the response of the cyclic budget revenues / expenses depending on the nature of the output gap. If the cyclical budget balance improved during the expansion periods, compared to the decrease recorded during the recession periods, or if the expansion periods are quite longer than the recession periods, then the asymmetry coefficient will be positive.

### Testing the panel's stationarity

So as the results of the research should not be affected by the influence of some structural breaks which may affect the variables included in the analysis, it is necessary to test their stationarity, by means of some tests which are specific to the panel. The form of an autoregressive process for a panel is as follows:

$$y_{i,t} = \rho_i \cdot y_{i,t-1} + X_{i,t} \cdot \delta_i + \varepsilon_{i,t} \quad (10)$$

Where;  $i$  refers to the units included in the panel during the period  $t$ .

The exogenous variables of the model, including the fixed effects or the individual trends are outlined by  $X_{i,t}$ , and  $\rho_i$  which constitute the autoregressive coefficient. If it is equal (in the module) to 1, then the dependent variable contains a unit root, while the series is non-stationary. In the economic literature, there are two hypotheses related to the significance of the autoregressive coefficient, according to which two categories of stationarity tests have been performed for a panel. On the one hand, the coefficient  $\rho_i$  is supposed to be common for all the analyzed countries, such as in the Levin, Lin and Chu (LLC), Breitung and Hadri tests, while on the other hand, the Im, Pesaran, Shin (IPS), Fisher-ADF and Fisher-PP tests take into consideration a different value of the coefficient  $\rho_i$  for each of the panel's entities, combining the results of the individual stationarity tests in order to create a result for the entire panel. Within this study, we realized a synthesis of the stationarity tests which were previously presented, but the option was for those which take into account the individual unit roots. Table 1 presents a stationarity test of the variables included within the initial models of the response functions (that is, at the zero integration level).

The variables BB and SBB have a unit root according to most of the stationarity tests, being integrated in category 1; that is, the reason why we included  $\Delta BB$  and  $\Delta SBB$  as dependent variables in models 4.1 and 4.2, was to calculate the difference between the actual level and the level which was lagged with a period. The other variables in the three models were included as stationaries (according to at least one test based on a common process and on a test performed according to the individual processes). The absence of

stationarity in the actual budget balance is the result of applying an asymmetric discretionary fiscal policy in the Eurozone member countries and of the public finance's consolidation, which took place during the period between 1994 and 2006. As a matter of fact, all the Eurozone member countries (except Netherlands, according to the Fisher test) were characterized by non-stationary series of the structural budget balance. As for the cyclical budget balance, its stationarity is the result of the automatic stabilizers' action, which is synchronized with the economy's cyclic evolutions (the cyclical budget surpluses from the expansion period were neutralized by the deficits from the recession period, thus a cyclical budget balance which is very close to zero was recorded during the entire period).

## RESULTS AND DISCUSSION

In order to identify the nature of the fiscal policy promoted within the entire Eurozone, its symmetry degree and the influence of the dummy variables upon the governments' behaviour, several versions of each of the three models have been estimated and were presented in the methodology of the research.

### The budget balance model

Within the BB model, the nature of the fiscal policy is outlined by the variation of the budget balance, and the obtained results are being included in Table 2, together with five versions of the basic model. The budget balance recorded an improvement during the periods 1993 and 2000, and 2003 and 2006, especially after the restrictiveness of the fiscal policy promoted within the Eurozone. The dependent variable which is lagged with a period is significant at 5%, and at 10% of significance threshold, reflecting a negative influence upon the variation which is subsequent to the budget balance. Thus, the promotion of an expansionary policy, which induced the budget deficit's increase with 1% of the GDP determined the budget deficit's decrease with 0.11 to 0.14% of the GDP for the next year. The sustainability condition for the share of the public debt in the GDP is met, and thus the budget balance got improved with 0.03 to 0.04% of the GDP for each increase of the previous stock of the debt with 1% of the GDP. The sensitivity of

**Table 2.** The estimations budget balance model.

<b>BB Model – <math>\Delta</math>BB (dependent variable)</b>	<b>1<sup>st</sup> version</b>	<b>2<sup>nd</sup> version</b>	<b>3<sup>rd</sup> version</b>	<b>4<sup>th</sup> version</b>
Constant	-2.13***	-2.78***	-2.89***	-2.29***
$\Delta$ BB(-1)	-0.11**	-0.13**	-0.14*	-0.12
Pdebt (-1)	0.03***	0.04***	0.04***	0.04***
OG(-1)	0.12*	0.12*		
OG <sup>P</sup> (-1)			0.17	0.21**
OG <sup>N</sup> (-1)			0.19**	0.13
Asymmetry coefficient ( $\phi_{BB}$ )			-0.02	0.08
Dummy <i>excessive deficit</i>	-1.21***			-1.30***
Dummy <i>emu*</i>		-1.52***	-1.66***	
Dummy <i>excessive deficit</i>				
R <sup>2</sup>	0.60	0.60	0.60	0.60
No. of observations	213	213	207	207
Autocorrelation of errors (p value)	0.98	0.61	0.55	0.90

\*\*\*, \*\* and \* statistically significant at 1, 5 and 10%, respectively. Source: Author's estimations in Eviews 6.

**Table 3.** The estimations of the structural budget balance model.

<b><math>\Delta</math>SBB (dependent variable)</b>	<b>1<sup>st</sup> version</b>	<b>2<sup>nd</sup> version</b>	<b>3<sup>rd</sup> version</b>	<b>4<sup>th</sup> version</b>	<b>5<sup>th</sup> version</b>
Constant	-1.76***	-2.42***	-1.95***	-2.53***	-2.40***
$\Delta$ SBB(-1)	-0.18**	-0.19**	-0.19**	-0.21***	-0.13*
Pdebt(-1)	0.03***	0.04***	0.03***	0.04***	0.03***
OG(-1)	0.23***	0.23***			
OG <sup>P</sup> (-1)			0.30***	0.25***	0.26***
OG <sup>N</sup> (-1)			0.26**	0.31***	0.32***
Asymmetry coefficient ( $\phi_{SBB}$ )			0.04	-0.06	-0.06
Dummy <i>excessive deficit</i>	-1.28***		-1.34***		
Dummy <i>excessive deficit</i> (-1)					-0.08
Dummy <i>emu*</i>					
Dummy <i>excessive deficit</i>		-1.61***		-1.71***	
R <sup>2</sup>	0.44	0.44	0.45	0.45	0.38
No. of observations	211	211	205	205	205
Autocorrelation of errors (p value)	0.94	0.82	0.95	0.79	0.77

\*\*\*, \*\* and \* are statistically significant at 1, 5 and 10%, respectively. Source: Author's estimations in Eviews 6.

the dependent variable according to the business cycle is 0.12, being significant only at the 10% level, which could rather reflect the promotion of an acyclic fiscal policy within the Eurozone. Thus, a previous lag of 1% of the GDP resulted in the increase of the actual budget balance with 0.12% of the GDP, hence reflecting a slight tendency to stabilize the business cycle.

The fiscal policy was anti-cyclic during the economic recession periods (according to the 3<sup>rd</sup> version), and also during the years when an inflationary lag was recorded (in the 4<sup>th</sup> version of the model). The asymmetry coefficient associated to the governments' behaviour according to the cyclic fluctuations was quite low, being 0.02 in the 3<sup>rd</sup> version and 0.08 in the 4<sup>th</sup> version. During the years when an excessive budget deficit was recorded, the level of the budget balance decreased between 1.21% and

1.3% of the GDP compared to the previous year. The decrease was higher when the Economic and Monetary Union was created (1.52 and 1.66% of the GDP, at a 1% significance level). The result is that the expansionary behaviour of the Eurozone governments has been emphasized since 1999, and this reflected more in the increase of the budget deficit than in the case of the analysis for the entire period.

### The structural budget balance model

According to the model of the structural budget balance, the fiscal policy promoted by the group of the Eurozone countries was anti-cyclic during the period between 1990 and 2009, as shown in Table 3. Thus, the existence of an

output gap of +/-1% of the GDP determined the increase and decrease of the structural budget balance with 0.23% of the GDP during the next year (with reference to the year when that gap was recorded). The obtained results were in accordance with those of other studies on the nature of the fiscal policy that was promoted within the Eurozone (Wyplosz, 2006), in which estimates were made that the fiscal policy was rather neutral (acyclic) until the creation of the Economic and Monetary Union and anti-cyclic after 1999. Thus, the sensitivity of the structural budget balance according to the output gap increased from 0.16 (a statistically insignificant value during the period between 1990 and 1998) to 0.32, between 1999 and 2009 (significant at 1%). The period which was previous to adopting the Euro currency (subsequent to the Maastricht Treaty) was characterized by the promotion of a restrictive fiscal policy (the increase of the SBB) in order to allow the meeting of the nominal convergence criteria which are specific to public finances. This strategy was necessary under the terms in which, all the member countries in the early 1990's (except Finland), recorded a deficit of the structural budget balance ranging between 2.5% of the GDP in Germany and 14.3% of the GDP in Greece.

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

With reference to the fiscal policy's response according to the nature of the business cycle's phases, a low asymmetry degree of the fiscal policy has been estimated (between -0.06 and 0.04). Thus, for a previous output gap of 1% of the GDP, the governments acted restrictively, increasing the SBB between 0.25 and 0.3% of the GDP, and for an output gap of -1% of the GDP, the governments stimulated the economy with the equivalent of 0.26 to 0.32% of the GDP. Although the asymmetry coefficient is quite low, the development of some cyclic fluctuations which are different from the point of view of their duration / intensity will result in higher variations of the SBB along a business cycle.

The estimate of the SBB model meets the stability condition of the public finances, under the terms in which the periods when the fiscal policy was promoted were followed by other periods when the governments acted more restrictively. Thus, for the increase / decrease of the SBB during year  $t-1$  compared to  $t-2$  with 1% of the GDP, the SBB decreased / increased during the year  $t$  with 0.18 to 0.21% of the GDP compared to  $t-1$ . As for the influence of the public debt balance upon the behaviour of the Eurozone governments, there were estimates for the validity of the relation which provided sustainability to public finances. Specifically, the 1% increase of the

balance which was previous to the public debt determined the increase with 0.3 to 0.4% of the GDP in the restrictiveness for the fiscal policy. A higher share of the debt results to an increase in costs with 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. The lagged variable of the public debt is weakly correlated with the lagged dependent variable, so that the SBB model is not affected by multicollinearity, as in the study made by Staehr (2008).

The influence of the dummy *excessive deficit* variable is significant, reflecting a negative impact on the structural budget balance, which decreased with 1.28 to 1.34% of the GDP, during the years when the budget deficit was recorded as 3% of the GDP. Once the Economic and Monetary union was created, the SBB got worse during the years with an excessive budget deficit, specifically with values of 1.61, and 1.71% of the GDP (this aspect being illustrated by the dummy *emu*\*dummy *excessive deficit*). Moreover, the last version of the SBB model suggests that the Eurozone governments did not immediately react in order to correct the previous excessive budget deficit (the sensitivity coefficient is 0.08, a statistically insignificant value). As a matter of fact, five of the Eurozone member countries (Germany, France, Greece, Italy and Portugal) recorded excessive deficits after 2000, which decreased only after at least two years.

### The cyclical budget balance model

This model is valid (homoskedasticity and absence of errors autocorrelation) when the influence of the dummy variable, which refers to the excessive budget deficit is excluded, this being a proof that its existence had an insignificant influence upon the economy's cyclic fluctuations. Among the exogenous variables of the model, only those which refer to the output gap are statistically significant, reflecting the influence of the automatic stabilizers, as it can be observed in Table 4. Their intensity is very close to the 0.5 sensitivity, identified in the economic literature and used as a convention regarding the impact of the automatic stabilizers upon the budget balance in the European economy. Thus, for a previous output gap of 1% of the GDP, the actual cyclical budget balance will be 0.5% of the GDP, and this will also determine the improvement of the actual budget balance. The automatic stabilizers have a very symmetric influence on the budget, with the asymmetry coefficient being only -0.02, suggesting a flexibility which is close to the budget returns both during the recession periods and also during the economic expansion periods. Thus, a negative gap of 1% of the GDP determined the budget deficit's increase with 0.49% of the GDP, while a 1% positive gap generated the deficit's decrease with 0.47% of the GDP.

**Table 4.** The estimations of the cyclical budget balance model

Variable	CBB	
	1 <sup>st</sup> version	2 <sup>nd</sup> version
Constant	-0.005	0
CBB(-1)	-0.06	-0.02
OG(-1)	0.48***	
OG <sup>P</sup> (-1)		0.47***
OG <sup>N</sup> (-1)		0.49***
Asymmetry co-efficient ( $\varphi_{CBB}$ )		-0,02
R <sup>2</sup>	0.90	0.87
No. of observations	223	216
Autocorrelation of errors (p-value)	0.20	0.16

\*\*\*, \*\* and \* are statistically significant at 1, 5 and 10%, respectively. Source: Author's estimations in Eviews 6.

Most of the Eurozone countries recorded fluctuations of the budget balance as a share in the GDP of approximately half of the previous output gap's intensity, whereas the cyclical budget balance recorded values ranging between -1.2 and 1.2% of the GDP in the Eurozone economies which were characterized by recessionary /inflationary gaps of low intensity, as in Germany, Belgium, France, Italy, the Netherlands and Portugal, while for Finland, Luxembourg, Greece and Ireland, the level of the cyclical budget balance was higher.

The analysis made in the case of the budget balance when the GDP is modified (as a result of the automatic stabilizers' action) is extremely important for the Euro zone member countries, as it outlines the magnitude of their fiscal margin of maneuver, within the limits required by "the stability and growth pact".

## CONCLUSIONS AND RECOMMENDATIONS

The performed analysis indicates quite a high influence of the economy's cyclic conditions upon the Eurozone governments' behaviour and upon the cyclical budget balance. The fiscal policy that was promoted during the period between 1990 and 2009 was anti-cyclic, under the terms in which the dependent variable was the variation of the structural budget balance and rather acyclic in the case of the variation of the actual budget balance. The results of the estimates for the panel consisting of the first twelve Eurozone countries do not entirely confirm the conclusions of other studies referring to the nature of the fiscal policy at least for two technical reasons. Firstly, the dependent variables were different from those which were used within this study; for example, Cimadomo (2006) used the same methodology as in this work, to identify a pro-cyclic fiscal policy promoted in the Eurozone countries during the period between 1995 and 2004, but as a dependent variable (and not of its variation) in the case of the structural budget balance. Secondly, the temporal dimension of the panel was different, including in this study the public finance

sustainability's increase stage in order to meet the nominal convergence criteria (1993 to 1999), the ten years since the Economic and Monetary Union was created and also the last two years of economic slowdown / decrease within the Eurozone.

The main results obtained in this study may be summarized as follows:

The two estimated models of the dynamic panel (that of the actual budget balance and that of the structural budget balance) met the stability condition, in which the coefficient of the dependent variable is lagged with one period, being negative. Thus, the promoted fiscal policy was not a persistent one, meaning that the years with expansionary policies were alternated with years of restrictive policies. With reference to this aspect, it was estimated that, after a year was characterized by the increase of the budget deficit with 1% of the GDP, during the next year the previous additional deficit was corrected with at least 0.11% of the GDP. As a result, we may state that the Eurozone governments acted, to a certain extent, for the public finance's sustainability, this aspect being reflected by the coefficient related to the model of the structural budget balance (between -0.18 and -0.21).

An anti-cyclic fiscal policy was promoted in the entire Eurozone, while the governments' response to the economy's cyclic fluctuations decreased along with the adoption of the Euro currency (because of the additional strict conditions stipulated in the "stability and growth pact"). Thus, the sensitivity of the discretionary fiscal policy according to the previous output gap was 0.37 between 1990 and 2001, compared to 0.23 during the entire period.

The Euro zone economies acted in stabilizing the public debt balance in the GDP. In eight out of the twelve Eurozone countries, in 2009, the public debt was superior to that of 1990, and significant adjustments were performed during this period for three of them (Belgium, Ireland and the Netherlands), under the terms of some initial values of at least 77% of the GDP. The response according to the public debt balance was different, from the point



of view of its intensity, before and after adopting the Euro currency. Thus, during the period between 1990 and 2000, the governments increased the fiscal policy's restrictiveness / expansion with 0.04% of the GDP for each public debt's increase / decrease with 1% of the GDP, then after 2001, the governments' response was 0.1% of the GDP.

The fiscal policy's symmetry degree was high, suggesting an anti-cyclic behaviour, which has a similar intensity both during the expansion periods, and also during the economic recession periods. For example, during the years when the output was above the potential value (with 1% of the GDP), the governments acted restrictively (SBB increased between 0.25 and 0.3% of the GDP), and during the years when the output was inferior to the potential value (with 1% of the GDP), the governments were expansionistic (that is, SBB decreased between 0.26 and 0.31% of the GDP). However, the existence of a very low asymmetry coefficient does not also generate a symmetric impact upon the actual SBB or BB, under the terms in which the recession periods differ from the expansion period from the point of view of their length / duration. Generally, the recession periods had quite lower intensities when compared to the expansion periods (until the beginning of the economic crisis), but their durations were quite longer.

The study confirmed the role of the automatic stabilizers in stabilizing the cyclic fluctuations within the Eurozone, with their influence being extremely less asymmetric. Thus, the existence of negative output gaps of at least 2.5% of the GDP in the twelve countries included the analysis (in 2009), the cyclic budget deficit and also the actual budget deficit that increased with at least 1.2% of the GDP, hence encouraging exceeding the 3% target of the GDP (with the exception of Luxembourg only, its budget deficit being 2.2% of the GDP in 2009).

The dummy variables used in the analysis increased the significance of the estimation models in which they were included, outlining the emphasis of the governments' expansionistic behaviour after 1999. Thus, during the years when the budget deficit exceeded 3% of the GDP, the expansionistic nature of the fiscal policy was reflected in a structural deficit which was higher with 1.28 to 1.34% of the GDP (during the entire period between 1990 and 2009) and in the one which was higher with 1.61 to 1.71% of the GDP (after 2009). Moreover, it has been estimated that the governments, which were characterized by an excessive deficit, did not react immediately to this decrease.

Under the terms of the actual crisis, the fiscal policy is considered to be the only macroeconomic policy which can stimulate the economic re-launching. The Eurozone countries which were included in this study will promote the same anti-cyclic fiscal measures (during the period between 1990 and 2009), but the manoeuvre limit is exhaustible at least for three reasons. Firstly, the amplitude of the economic decrease, involving a sudden depreciation of the budget balance, was high. Also, this was due to the

automatic stabilizers' action. Secondly, the public debt's share in the GDP was quite high, while the rhythm of its adjustment was slowed down after adopting the Euro currency (with reference to the period between 1995 and 2001). Thirdly, despite the fact that the effort made for the budget adjustment was quite low during the three years which preceded the economic crisis (2005 to 2008), the economic situation was more favourable. Although all the countries passed through an expansion period, only four of them (Germany, Italy, Luxembourg and Portugal) promoted a slightly restrictive policy.

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## REFERENCES

- Arellano M, Bond S (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Rev. Econ. Stud.*, 58: 2-20.
- Balassone F, Francese M, Zotteri S (2008). Cyclical Asymmetry in Fiscal Variables. Bank of Italy, Temi di Discussione, No. 671.
- Balassone F, Francese M (2004). Cyclical Asymmetry in Fiscal Policy, Debt Accumulation and the Treaty of Maastricht". Bank of Italy, Temi di Discussione, No. 531.
- Baltagi BH (2001). *Econometric analysis of panel data*. Chichester: Wiley.
- Beetsma R, Giuliodori M (2008). Fiscal Adjustment to Cyclical Developments in the OECD: An Empirical Analysis Based on Real-Time Data. CEPR Discussion Paper, No. 6692.
- Bruno GSF (2005). Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. *Econ. Lett.*, Elsevier, 87(3): 3-12.
- Buti M, Franco D, Ongena H (1998). Fiscal Discipline and Flexibility in EMU: the Implementation of the Stability and Growth Pact. *Oxford Rev. Econ. Policy*, 14 (3): 81-97.
- Buti MA, Sapir, eds. (1998). *Economic Policy in EMU – A Study by the European Commission Services*. Oxford University Press
- Cimadomo J (2008). Fiscal Policy in Real Time. European Central Bank, Working Paper Series, No.919.
- Deborah M, Waltraud S (2007). Bringing macroeconomics back in to the political economy of reform: The Lisbon Agenda and the 'fiscal philosophy' of EMU. *JCMS: J. Common Mark. Stud.*, 45(1): 81-103.
- Dolls M, Fuest C, Peichl A (2009). Automatic Stabilizers and Economic Crisis: US vs. Europe. CESifo Working Paper Series CESifo Working Paper, No. 278.
- European Commission (2010). Cyclical adjustment of budget balances, Economic database, DGCFIN
- Gavin M, Perotti R (1997). Fiscal Policy in Latin America. In: NBER Macroeconomics Annual. MIT Press: Cambridge, Massachusetts.
- Golinelli R, Momigliano S (2008). The cyclical response of fiscal policies in the euro area. Why do results of empirical research differ so strongly? Bank of Italy, Temi di Discussione, No.654.
- von Hagen J, Wyplosz C (2008). EMU's Decentralized System of Fiscal Policy, *European Economy - Economic Papers*, No. 306 pp. 1-19.
- Judson RA, Owen AL (1999). Estimating dynamic panel data models: a guide for macroeconomists. *Econ. Lett.*, Elsevier, 65(1): 9-15.
- Kumar MS, Ter-Minassian T (2007). *Promoting Fiscal Discipline*. Edited by IMF.

- Manasse P (2006). Procyclical Fiscal Policy: Shocks, Rules, and Institutions. A view from MARS. IMF Working Paper No. 06/27
- Staeher K (2008). Fiscal policies and business cycles in an enlarged euro area. *Econ. Syst.*, 32(1): 46-69.
- Talvi E, Végh C (2000). Tax Base Variability and Procyclicality of Fiscal Policy. NBER Working Paper, No. 7499.
- Van den Noord, P. (2000). The Size and Role of Automatic Fiscal Stabilizers in the 1990s and beyond. OECD Economic Department, Working Paper, No. 230, pp. 1-31.
- Wyplosz C (2006). European Monetary Union: the dark sides of a major success. *Econ. Policy*, 21(46): 207-261.