

The role of fiscal policy in the financial crisis. Challenges and solutions

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Abstract. *Since the financial crisis was an economic shock with a considerable unfavorable fiscal component, the prospect of maintaining the sustainability of public finances was a challenge for each country. This study aims to examine the extent to which Central and Eastern European (CEE) countries have been able to acquire or maintain a sustainable fiscal stance both before and during the crisis by empirically estimating three fiscal reaction functions (FRF). Thus, the nature of the fiscal policy promoted within the CEE states, the degree of fiscal sustainability, the persistence of the promoted fiscal behavior and the degree of fiscal discretionism are identified. The results confirm statistically relevant parameters for all three FRFs estimated, indicating the sustainability of public finances in CEE countries, despite the developments implied by the economic crisis.*

Keywords: fiscal reaction function, fiscal policy, panel regression, fiscal sustainability, Central and Eastern European countries.

JEL Classification: C23, E62, H61, H62.

Introduction

Fiscal policy is a constant topic of debate in the European Union (EU), its importance being underpinned in the fiscal criteria promoted by the Maastricht Treaty, as well as the Stability and Growth Pact (SGP). In the current context, defined by important restrictions associated with the implementation of fiscal policies, particularly in CEE countries, and the need for fiscal consolidation, assessing how fiscal authorities adjust their reactions is of particular importance, suggesting their expected future response.

Therefore, the present paper aims to investigate the sustainability of public finances at the level of the selected group of CEE states, as well as to highlight the role of fiscal behavior in the divergent performance observed in these countries in the context of the financial crisis through an empirical analysis using FRF as a tool. Thus, the nature of the fiscal policy promoted within the CEE states, the degree of fiscal sustainability, the persistence of the promoted fiscal behavior and the degree of fiscal discretionism are identified, in line with the approach proposed by Dinu et al. (2011).

The dependent variables of the three panel FRF specifications, expression of the fiscal stance, are the actual primary balance (pb) expressed as a percentage of GDP, the cyclically adjusted primary balance (capb), indicating the discretionary fiscal policy measures, and the cyclical component of the budget balance (cbb), the latter being a measure of automatic stabilizers, in view of the fact that it is directly influenced by the cyclical fluctuations of the economy.

The study is structured as follows: the first section provides a review of the literature on assessing fiscal sustainability through FRF, the second section is dedicated to describing the econometric specifications, the methods and the data used, highlighting the importance of using the FRF. The empirical results are presented in the third section, and the concluding observations of the study are presented in the last section of this paper.

1. Literature review

Fiscal sustainability has known a detailed research into the literature of the past two decades, its importance being underlined by the fact that the fiscal policy is confined by the need to finance the deficit, governments facing limits associated with the extent to which they can borrow.

The sustainability of public finances implies, in general, that governments serve their current and future obligations in line with the inter-temporal budgetary constraint (IBC), which requires that the net present value of future primary balances ought to be sufficient to repay the initial level of debt, and the transversality condition, which implies that the net present value of the future debt will fall to zero over time, which implies that the debt-to-GDP ratio should not increase at a rate superior to the difference between the interest rate and the growth rate (Afonso et al., 2005).

Given that the definition of fiscal sustainability is based on the IBC, the analysis in the literature was based mainly on its empirical form:

$$G_t + (1 + i_{t-1}) \times D_{t-1} = T_t + D_t$$

According to which the total government revenue, including tax revenue (T_t) and loans (D_t) of the current period, should be equal to the total government expenditure (G_t) plus debt service (including the principal of the previous period (D_{t-1}) and the interest expenses ($i_{t-1} \times D_{t-1}$).

Bohn (1998), however, simplified this relation in the form of an equation exploring the link between public debt (D_t), primary balance (Pb_t), defined as budget revenues minus public expenditure, less interest, and the interest rate (R_{t-1}).

$$D_{t-1} = (D_t - Pb_t) \times (1 + R_{t-1})$$

A direction of the literature on fiscal sustainability uses the FRF as the main tool of empirical analysis, i.e. an equation describing the behavior of a fiscal variable of interest, taking into account current fiscal, macroeconomic and political conditions, through its estimation being provided a valid method for assessing fiscal sustainability. The origin of the fiscal reaction function is found in the IBC equation, which is reiterated in order to determine different FRFs, in accordance with the specific research terms and objectives of the authors.

The literature based on the empirical approach was initiated by influential study of Bohn (1998) on the fiscal policy pursued by the US in the period 1916-1995, in which he used the following FRF:

$$ps_t = \alpha \times d_t + \beta \times Z_t + \varepsilon_t = \alpha \times d_t + \mu_t$$

where

$$\mu_t = \alpha \times Z_t + \varepsilon_t$$

In this equation, ps_t and d_t represent the ratio of the primary balance to GDP and the government debt as a share of GDP, α denotes the ps_t reaction's capacity relative to the d_t level, Z_t contains a set of various other determinants of the primary balance (economic, institutional, *et cetera*), and the errors and random shocks are captured by the error term ε_t .

Bohn (1998) finds that the authorities reacted to a positive debt dynamics with an increase in the primary deficit, reflected by a positive and statistically significant reaction coefficient associated to the government debt, which would indicate reliable information on the sustainability of the fiscal stance, regardless of how the interest rate and the GDP growth rate are compared. This argument is justified by the author in view of the fact that a positive and significant debt coefficient (α) is a sufficient condition to ensure fiscal sustainability, denoting that a country is committed to systematically reduce or maintain stable government debt ratios in GDP, conditioned by the existence of a set of other factors, by adjusting the primary budget balance with the increase in public debt. In other words, more resources are made available for debt servicing.

Such a condition, however, clearly implies a retrospective approach to the extent that only reveals the public debt feedback in the estimation sample, so that such an approach can not predict the future fiscal reaction of a government and, therefore, whether the latter will repay the public debt (Baldi and Staehr, 2015).

A significant number of studies engage in the methodology used by Bohn (1998). Thus, the studies based on the FRF tend to find evidence of a positive and significant fiscal reaction to debt growth, with an important variability, however, depending on the country and the time sample considered. Following a relatively extensive literature review, Checherita-Westphal and Ždarek (2015) found that the intensity of the fiscal response to the debt generally ranges between 0.01 and 0.10. Moreover, the studies using panel data focusing on the EU/EA find this coefficient to be between 0.03 (European Commission, 2011) and 0.10 (Baldi and Staehr, 2015).

2. Research methodology

2.1. The econometric specification

In order to identify the nature of the fiscal policy promoted within the CEE states, the degree of fiscal sustainability, the persistence of the promoted fiscal behavior and the degree of fiscal discretionism, three FRFs models will be used in line with the approach proposed by Dinu et al. (2011).

The dependent variables of the three panel FRF specifications, expression of the fiscal stance, are the actual primary balance (pb) expressed as a percentage of GDP, the cyclically adjusted primary balance (capb) and the cyclical component of the budget balance (cbb), expressed as a share of potential GDP, according to the definition. Given that interest is largely the result of previous decisions on debt accumulation, it is justified to consider the reaction to the actual primary balance and the cyclically adjusted primary balance to various explanatory variables.

Thus, in order to extend the research to incorporate the cyclical behavior of the fiscal policy, the actual primary balance is decomposed according to the following relationship:

$$pb_t = capb_t + cbb_t$$

where the cyclically adjusted primary balance indicates the discretionary fiscal policy measures, this indicator not being directly affected by the economic cycle, and the cyclical component of the primary budget balance provides a measure of automatic stabilizers, given that it is influenced directly by the cyclical fluctuations of the economy. Specifically, automatic stabilizers refer to the fiscal categories that react automatically to the economic cycle without any intervention from fiscal policy authorities.

The actual primary balance model (PB)

Within this model, the FRF engaged aims at examining the influence of the macroeconomic and institutional factors on the fiscal stance, thus explaining the behavior

of the fiscal policy in the CEE states, distinguishing the nature of the fiscal policy, as well as its stabilizing impact. This model has as reference the studies elaborated by Bohn (1998), Khalid et al. (2007) and Nguyen (2013).

According to the literature, the panel FRF's general specification is:

$$sbp_{i,t} = \alpha_0 + \alpha_1 \times sbp_{i,t-1} + \alpha_2 \times dat_{i,t-1} + \alpha_3 \times gap_{i,t} + \alpha_4 \times expg_{i,t} + \alpha_5 \times fri_{i,t} + \alpha_6 \times ri_{i,t} + \alpha_7 \times crisis_{it} + \varepsilon_{it}$$

where $sbp_{i,t-1}$ represents the primary balance of the previous period in country i ; $dat_{i,t-1}$ denotes the stock of debt in current year; $gap_{i,t}$ represents the output gap; $expg_{i,t}$ expresses unexpected government spending; $ri_{i,t}$ is the rate of inflation; $fri_{i,t}$ quantifies the Fiscal Rules Index (FRI) computed by the European Commission (EC). Also, a dummy variable was introduced to capture the negative impact of the financial crisis on the primary balance ($crisis_{it}$). Measurement errors, as well as random shocks, are captured by the error term ($\varepsilon_{i,t}$), while the constant term of the model (α_0) captures the changes in the dependent variable, which could not be explained by the chosen explanatory variables.

The variables were expressed as a ratio of GDP, except for the output gap, which, according to the definition, was expressed as a ratio of potential GDP. The FRI and inflation rate were expressed as indices.

The Cyclically Adjusted Primary Balance Model (CAPB)

The CAPB model is commonly used in studies that examine the discretionary response of the fiscal policy to business cycle, thus investigating the existence of an output stabilizing reason in fiscal policy making, given that this indicator is easier to control by the authorities concerned.

Therefore, the econometric specification used in this model, having as reference the studies developed by Gali and Perotti (2003), CE (2011) and Turrini (2008), is as follows:

$$sbpac_{i,t} = \beta_0 + \beta_1 \times sbpac_{i,t-1} + \beta_2 \times dat_{i,t-1} + \beta_3 \times gap_{i,t} + \beta_4 \times expg_{i,t} + \beta_5 \times fri_{i,t} + \beta_6 \times euro_{i,t} + \beta_7 \times pfi_{i,t} + \varepsilon_{i,t}$$

where $sbpac_{i,t-1}$ is the cyclically adjusted primary balance of the previous period in country i ; $dat_{i,t-1}$ denotes the stock of debt in current year; $gap_{i,t}$ represents the output gap; $expg_{i,t}$ expresses unexpected government spending; $fri_{i,t}$ quantifies the FRI computed by the EC. Two dummy variables were used in order to allow for changes in the fiscal policy behavior, namely to quantify the structural changes implied by the euro area membership ($euro_{i,t}$) and the adoption of a specific fiscal program in the context of the request for international financial assistance ($pfi_{i,t}$). Measurement errors, as well as random shocks, are captured by the error term ($\varepsilon_{i,t}$), while the constant of the model (β_0) captures the changes of the endogenous variable, which could not be quantified through the chosen explanatory variables.

The *sbpac* and *gap* variables were expressed as ratio to potential GDP, according to the definition, while *dat* and *expg* variables were specified as a share of GDP.

In this case, the inflation rate and the dummy variable associated with the crisis were excluded from the panel because they did not show statistical significance.

The cyclical budget balance model (CBB)

The "cyclical" or "non-discretionary" balance is defined as the component of the primary budget balance, whose variations are attributable, at least in the short term, to causes beyond the direct control of the fiscal authorities, i.e. business cycle fluctuations. Specifically, the cyclical component of the primary balance may be affected by fluctuations in the cyclical position of the economy through observable variations in unemployment, which implies a corresponding change in social assistance expenditure, as well as the fluctuations in the macroeconomic bases specific to the different categories of taxes, these variations being interpreted as changes in government revenue.

Thus, this model emphasizes the influence of cyclical fluctuations on the fiscal position, given the fact that the dependent variable approximates a measure of the automatic stabilizers, according to the approach proposed by Dinu et al. (2011). In order to highlight the characteristics of this model, the variable associated with the public debt stock was excluded from the model.

Thus, the econometric specification of this model is:

$$sbc_{i,t} = \gamma_0 + \gamma_1 \times sbc_{i,t-1} + \gamma_3 \times gap_{i,t} + \gamma_4 \times gap_{i,t-1} + \varepsilon_{i,t}$$

where $sbc_{i,t-1}$ represents the cyclical balance of the previous period in country i ; $gap_{i,t}$ denotes the current output gap; $gap_{i,t-1}$ quantifies the output gap of the previous period. Measurement errors, as well as random shocks are quantified by the error term ($\varepsilon_{i,t}$), while the constant of the model (γ_0) explains changes in the endogenous variable, which could not be captured by the chosen explanatory variables.

The variables were expressed as a percentage of potential GDP, according to the definition.

2.2. Description of the data

The sample used in this analysis includes ten CEE countries, namely emerging economies, former countries in transition and current members of the EU: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. This delimitation is based on two criteria, namely the geographical position and the economic structure of the states.

Given the limited availability of the data for CEE states, the estimation of individual FRFs is not feasible, thus FRFs being estimated in a panel analysis. Although the panel used in this research is unbalanced, relatively few observations are missing, the panel's time dimension being at most 22 years (where the starting year is 1995). Thus, 2016

represents the final year of observation of the sample, while the starting year varies according to the availability of the data.

In order to examine the fiscal sustainability hypothesis in the selected CEE countries, the data used in this study, except for the FRI, which was taken from the EC's fiscal rules database, was extracted from AMECO, this implying the advantage that the collected data set is determined using a uniform methodology, i.e. the ESA 2010 accounting standard, which is particularly important in a panel analysis.

The expenditure gap is defined as the deviation of the primary expenses from the trend. Thus, in this paper the indicator concerned was computed using the following formula:

$$expg_{i,t} = \frac{(primary\ expenditure_{i,t} - trend_{i,t})}{trend_{i,t}} \times 100$$

2.3. Estimation methods

The estimation of the three FRFs encounters two possible problems, namely heterogeneity and endogeneity, which are especially important in case of panel analyzes, in which a common FRF is engaged. Thus, heterogeneity is associated to the specific features of each country which could not be explained by the specification of the models. The literature offers some approaches to overcome this problem. The standard approach implies the inclusion of country-specific fixed effects to capture all country-specific factors that are not explicitly controlled by the model's constant, assuming, in parallel, homogeneous coefficients of the explanatory variables.

Endogeneity issues⁽¹⁾ with regard to the specifications of the three models need to be addressed. Specifically, the output gap should be somewhat correlated with the dependent variable, both determining the fiscal position and being determined by fiscal policy, as a result of the effect of fiscal multipliers, while government debt may be correlated with the model's residuals, given the fact that a country effective in generating high primary balances due to unobservable factors, captured by residuals, will tend to have a lower public debt (Medeiros, 2012).

Initially, the three FRFs are estimated using FE OLS. Considering the possibility of a correlation relation between the explanatory variables and the error term due to non-linearity and more complex interactions between variables, the paper also presents FRFs estimated by means of the methods FE TSLS and FE GMM. Thus, using a variety of modeling techniques this paper assures the robustness of the results and explores different aspects of the data.

That being said, the results of this paper should be viewed with caution, especially in terms of typical estimation problems for panel sets with a small sample size, as is the case with this research.

3. Main results of the research

Table 1. *The actual primary balance model results*

	FE OLS	FE TSLS	FE GMM
C	-2,78***	-3,40***	-3,40***
Primary balance t-1	0,23***	0,23***	0,23***
Stock of public debt	0,07***	0,08***	0,08***
Output gap	-0,07*	-0,09**	-0,09**
Expenditure gap	-0,25***	-0,29***	-0,29***
Inflation rate	0,02**	0,05*	0,05*
Fiscal Rules Index	0,51***	0,50***	0,50***
Crisis dummy	-1,22***	-1,03***	-1,03***
Number of observations	190	140	140
R ²	75,4%	77,4%	77,4%
Adjusted R ²	73,1%	74,5%	74,5%
S.E. of regression	1,39	1,27	1,27
Durbin-Watson statistic	1,56	1,62	1,62
F-statistic probability	0,0%	0,0%	-

***p < 0,01; **p < 0,05; *p < 0,1.

Source: Authors' estimations.

The coefficient α_1 reflects the degree of stability of the fiscal policy promoted. Thus, a negative value recorded by the α_1 coefficient signals the consolidation of the current fiscal position relative to the previous developments of this indicator, given that a decrease of the primary balance during the year t-1 should be followed by an increase of the budgetary balance during the year t, in order to compensate for the accumulation of deficit in the previous period.

The primary balance appears to have a high degree of persistence over time, given that the dependent variable from the previous period always has a positive and very significant value, regardless of the method used. Thus, the promotion of an expansionary policy, which triggered the increase of the budget deficit by 1% of GDP, will cause the latter increase by 0.23% of GDP in the following year, regardless of the method considered, the consolidation of the fiscal position regarding the deficit accumulation in the previous period not being pursued within the CEE countries. On the contrary, we can see the manifestation of a process of accumulation of deficits, which may imply a broad process of fiscal consolidation in the future, as was the case with several CEE countries, namely Latvia, Romania and Hungary. It is possible, however, that after the crisis changes have occurred regarding this behavior, but this argument can not be investigated due to the small size of the post-crisis data.

The persistence of the fiscal position may be due to a series of structural and institutional attributes, including information delays, policy constraints and implementation gaps. A high degree of persistence may suggest difficulties associated with changing the level of spending or taxation.

The coefficient α_2 quantifies the size of the fiscal consolidation in response to the level of the stock of public debt. In other words, the coefficient α_2 assesses the satisfaction of the

government debt sustainability condition, a positive value of this coefficient indicating that fiscal policy can be considered prudent or sustainable, given that an increase in the stock of debt generated by different macroeconomic and financial conditions is followed by an increase in the primary balance, with more resources being made available to debt servicing. In this way, fiscal policy, on average, seems to adjust to meet IBC. In the present case, the government debt sustainability condition is met, with the primary balance improving by 0.07-0.08% of GDP at each 1% of GDP growth in the debt stock. This result is in line with those reported in the Baldi and Staehr (2015) and EC (2016).

The coefficient α_3 represents the total response of the primary budget balance to cyclical conditions, being generated by a combination of discretionary fiscal actions and automatic stabilizers. If this coefficient is positive, fiscal policy can be considered anti-cyclical, given that favorable (unfavorable) economic developments would lead to an improvement (deterioration) of the country's budgetary position. Thus, in the context of a negative (positive) output gap, the budget balance will decrease (increase) as a result of promoting an expansionary (restrictive) fiscal policy. However, if the parameter in question exhibits a negative value, then fiscal policy can be characterized as pro-cyclical, contributing to the amplification of cyclical fluctuations. Instead, a statistically insignificant coefficient indicates that the fiscal policy is neutral.

The sensitivity of the dependent variable to the cyclical fluctuations is -0.07% of GDP for OLS and -0.09% of GDP for TSLS and GMM, reflecting the promotion of a pro-cyclical fiscal policy within the CEE countries. Thus, an output gap of 1% of GDP will imply the reduction of the primary balance by 0.07-0.09% of GDP, emphasizing the promotion of an expansionary fiscal policy, cyclical fluctuations being amplified in this context. These findings are similar to those highlighted in the research conducted by EC (2016) on FRFs associated to the CEE states.

The coefficient α_4 confirms the impact of unexpected expenditure on the primary budget balance. In particular, an increase of 1% of GDP in terms of expg involves a contraction of the primary balance of 0.25% of GDP for OLS and 0.29% of GDP for TSLS and GMM. This development is justified, as an increase in expg is implicitly associated with an increase in government expenditure.

In response to the adverse developments regarding the fiscal position involved by the financial crisis, European countries have consolidated the set of fiscal rules aimed at limiting public debt and fiscal imbalances. In this paper, including a measure of the institutional guarantees for fiscal discipline proves to have a favorable impact on the primary balance, namely 0.50-0.51% of GDP. The finding of efficiency in improving the fiscal position resulting from the existence of stronger tax rules is in line with the findings of Afonso and Hauptmeier (2009), EC (2011, 2016) and Debrun et al. (2008). Specifically, fiscal rules imply an increased predictability of the fiscal policy, contributing to strengthening its credibility.

The impact of inflation on the fiscal position is quantified by the coefficient α_6 . Thus, a 1% increase in the inflation rate results in an increase in the actual primary balance of 0.02% of GDP for OLS and 0.05% of GDP for TSLS and GMM. The positive influence of the inflation rate can be justified by the reasoning that the increase in government revenues may be due to a higher inflation rate. This argument, however, requires the investigation of the specific indexing mechanisms.

The dummy variable aiming at investigating the implications of the crisis on the fiscal policy has a high significance irrespective of the estimation technique used, indicating a fundamental change in the fiscal behavior. Specifically, the dummy variable in question reveals a behavior of limiting primary budget surpluses in CEE countries after 2009, this finding being associated to a strong deterioration of 1.22% of GDP for OLS and 1.03% of GDP for TSLS and GMM. This result is justified, given that the recession was an economic shock with a considerable adverse fiscal component, maintaining the sustainability of public finances being a challenge for each country.

Table 2. *The cyclically adjusted primary balance model results*

	FE OLS	FE TSLS	FE GMM
C	-2,40***	-2,58***	-2,58***
Cyclically adjusted primary balance t-1	0,27***	0,21***	0,21***
Stock of public debt	0,05***	0,06***	0,06***
Output gap	-0,35***	-0,42***	-0,42***
Expenditure gap	-0,22***	-0,28***	-0,28***
Fiscal Rules Index	0,20	0,53***	0,53***
Euro adoption dummy	-1,06**	-1,56***	-1,56***
Fiscal programme dummy	-1,07***	-1,49**	-1,49**
Number of observations	185	137	137
R ²	71,5%	74,4%	74,4%
Adjusted R ²	68,8%	71,0%	71,0%
S.E. of regression	1,42	1,30	1,30
Durbin-Watson statistic	1,58	1,71	1,71
F-statistic probability	0,0%	0,0%	-

***p < 0,01; **p < 0,05; *p < 0,1.

Source: Authors' estimations.

The coefficient β_1 , which corresponds to the degree of persistence regarding the discretionary fiscal position, recorded a value of 0.27% of GDP for OLS and 0.21% of GDP for TSLS and GMM, suggesting that the stability condition of public finances is not met for the primary discretionary balance, as well, periods that witnessed the promotion of an expansionary discretionary policy not being alternated by periods when governments have behaved more restrictively. Thus, the increase of the deficit in the previous year by 1% of GDP will lead to an increase of this indicator by 0.21-0.27% of GDP in the current year, suggesting that the fiscal authorities do not consider the developments associated with the discretionary fiscal position in the previous period in the decision-making process.

The results indicate that, at all conventional levels of significance, the coefficient β_2 , indicating the discretionary fiscal response with respect to the government debt is different from zero and positive, thus confirming the validity of the public finance sustainability hypothesis. In particular, an increase in the debt stock by 1% of GDP will result in a fiscal contraction of 0.05-0.06% of GDP, measured by the increase in the cyclically-adjusted primary balance, respectively the reduction of the deficit recorded by the latter. Such a reaction is sufficient for ensuring the long-term compliance with IBC, implying that the group of countries is unlikely to become insolvent in the long run.

The coefficient β_3 , highlights the response generated by means of fiscal discretionary actions with respect to the cyclical fluctuations, the influence of the automatic stabilizers being excluded from this model. Thus, according to the CAPB model, the discretionary fiscal policy promoted by the ECE group was strongly pro-cyclical, the existence of an output gap of 1% of GDP resulting in a significant decrease in capb, i.e. by 0.35-0.42% of GDP, highlighting the promotion of an expansionary fiscal policy. We can therefore argue that fiscal authorities did not act to stabilize the cyclical fluctuations recorded at the level of the economy, but rather to amplify them, the fiscal position not being consolidated during the favorable economic periods, which may imply a constraint in promoting anti-cyclical expansionary policies in adverse economic times, as has been the case for many CEE countries, this group of countries being forced to implement a restrictive fiscal policy in order to achieve structural adjustments, thus continuing to promote the amplification of the cyclical fluctuations and deteriorating the structural fiscal positions.

The explanations of pro-cyclicality in bad times lie in the compromise faced by fiscal authorities concerning the implementation of an impulse on aggregate demand for cyclical stabilization instead of pursuing to maintain fiscal discipline.

Also in this case, the increase of public expenditure deviation from the long-term trend implies a negative response from the dependent variable, reflected by the coefficient β_4 . Therefore, under the conditions of an increase by 1% of GDP of this indicator, the discretionary position records a contraction of 0.22% of GDP for OLS and 0.28% of GDP for TSLS and GMM.

Fiscal rules are again considered to be effective, being associated with an improvement of capb by 0.20% of GDP for OLS and 0.53% of GDP for TSLS and GMM.

The influence of the dummy variable associated with the euro area membership is significant, implying a deterioration of capb by 1.06% of GDP for OLS and 1.56% of GDP for TSLS and GMM, starting with the year the CEE country has adopted the euro. A downward trend in the primary surpluses is therefore highlighted in this period, which indicates a weaker answer from capb after joining the euro area. This result is of particular relevance, especially as fiscal policy is one of the few instruments available for macroeconomic stabilization in the framework of a monetary union, in the chosen sample this being the case of Estonia, Latvia, Lithuania, Slovakia and Slovenia. Moreover, these

estimates confirm the result that the SGP restricts the fiscal policy in the euro area more than in the CEE countries which have not joined yet to the monetary union, given that fiscal discipline is strengthened under a common monetary policy. In other words, inside a monetary union, awareness of fiscal sustainability issues is high, an economic crisis induced by the individual Member State's deficit having an immediate effect on all other members through a change in the value of the common currency. In addition, the risk of contagion increases with a higher degree of integration. Therefore, promoting and maintaining individual fiscal discipline within the monetary union represents a moral hazard.

Also, the years that witnessed the implementation of a certain fiscal programme associated with the request for international financial assistance were characterized by the significant decrease of the capb, quantified by the coefficient β_7 , respectively by 1.07% of GDP for OLS and 1.49% GDP for TSLS and GMM. This development can be explained in the light of the commitments made with regard to the fiscal conduct to be adopted in order to consolidate public finances and correct the existing imbalances in the context of the external financial assistance programme.

Table 3. *The cyclical budget balance model results*

	FE OLS	FE TSLS	FE GMM
C	0,00	0,00	0,00
Cyclical budget balance t-1	0,61***	0,83***	0,83***
Output gap	0,40***	0,41***	0,41***
Output gap t-1	-0,24***	-0,34***	-0,34***
Number of observations	197	137	137
R ²	98,6%	99,3%	99,3%
Adjusted R ²	98,5%	99,2%	99,2%
S.E. of regression	0,19	0,15	0,15
Durbin-Watson statistic	1,82	1,89	1,89
F-statistic probability	0,0%	0,0%	-

***p < 0.01; **p < 0,05; *p < 0,1.

Source: Authors' estimations.

The cyclical component of the budget balance shows a high degree of persistence over time, as measured by the coefficient γ_1 , which has a positive and very significant value. Specifically, the increase of the cyclical deficit by 1% over the previous period, in response to the cyclical conditions, will imply an increase in the current cyclical deficit by 0.61% of GDP for OLS and 0.83% of GDP for TSLS and GMM.

This paper assumes not only that the current level recorded by the output gap is important in terms of cyclical balance adjustment, but a major contribution to the evolution of this indicator lies also in the output gap of the previous period.

Thus, the coefficients γ_2 and γ_3 provide information on the reaction of the fiscal position to the current and previous cyclical variations, approximating only the answer recorded through the action of the automatic stabilizers, the influence of the discretionary measures not being quantified. Thus, in the context of a contemporaneous output gap of 1% of

GDP, the cyclical budget balance will increase by 0.40-0.41% of GDP, involving a pro-cyclical effect, while the cyclical fiscal response to an output gap of 1% recorded in the previous period will imply a cyclical reduction of 0.24% for OLS and 0.34% for TSLS and GMM, reflecting an anti-cyclical response. It can be noticed, therefore, the destabilizing action of the automatic budgetary reaction to cyclical developments recorded in the previous period.

It should be noted that the intensity of automatic stabilizers identified by this paper is very close to the conventional one, i.e. of 0.5%, mentioned in the economic literature and used as a convention on the impact of automatic stabilizers on the budget balance in the European economy.

Moreover, the analysis on cyclical balance sensitivity in terms of fluctuations in the output gap is not only useful in quantifying the size of automatic stabilizers, but is extremely important for European countries, especially for those participating in the monetary union, as it highlights the size of the available margin of maneuver, subject to the limits imposed by the SGP.

4. Conclusions and recommendations

The analysis shows a moderate influence of the cyclical conditions on the behavior of fiscal authorities in CEE countries, implying a reduction of 0.07-0.09% of GDP in the primary balance at each increase by 1% in the output gap, thus reflecting the promotion of pro-cyclical fiscal policies. However, as previously noted in this paper, the primary balance responds to the cyclical fluctuations both through discretionary stabilization actions and through the action of automatic stabilizers. Thus, the assessment of the fiscal policy by means of the capb's response reveals a pro-cyclical discretionary policy, the cyclical sensitivity coefficient in this case amounting to -0.35% of GDP for OLS and -0.42% of GDP for TSLS and GMM. The study also confirms the role of automatic stabilizers, their influence in stabilizing the cyclical fluctuations in CEE countries being 0.41-0.42% of GDP, relatively close to the value recorded by the discretionary sensitivity coefficient to the economic cycle.

Thus, we assume that the pro-cyclical properties of the primary balance adjustments regarding the contemporaneous output gap are induced by the effects implied by the policy makers' actions. This finding is of great importance, given that a higher influence of the automatic stabilizers reduces the need for discretionary measures during economic recessions. A justification for the observed pro-cyclicality is that fiscal authorities may want to engage in promoting an anti-cyclical fiscal policy, but they don't have adequate information on the current cyclical conditions, given that real-time estimation of indicators associated with the economic cycle is subject to significant uncertainty, mainly due to revisions concerning the potential GDP estimates. Thus, the pro-cyclicality of fiscal policy may result *ex post*, although the intention of the fiscal authorities was to promote a counter-cyclical fiscal stance.

This finding highlights the need to shift the response burden to automatic stabilizers to a greater extent, this reasoning implying the elimination of decision and implementation gaps that are characteristic for the discretionary actions.

Moreover, the results confirm a positive reaction of the fiscal position regarding the changes in the debt stock, but this response needs to be assessed in parallel with the fiscal reaction capacity associated with the cyclical developments.

The estimates for the first model indicate a pro-cyclical response associated with primary surpluses (-0.07% of GDP for OLS and -0.09% of GDP for TSLS and GMM) close to the consolidation reaction to the stock of debt (0.07-0.08% of GDP), which indicates that, as a whole, the primary balance adjustment pursues both stabilization and consolidation objectives. The results of the second model, however, highlight the fact that the fiscal authorities attach a greater importance to stabilization objectives through discretionary actions (-0.35% of GDP for OLS and -0.42% of GDP for TSLS and GMM) compared to the consolidation aims (0.05-0.06% of GDP). This finding is in contradiction with the results obtained by Ballabriga and Martinez-Mongay (2002), arguing that within the EU fiscal authorities are pursuing fiscal consolidation to a higher degree than cyclical stabilization objectives. This behavior could be justified by the relatively low level of government debt in CEE states.

Moreover, the estimates of the three models highlight that the condition of stability for public finances is not fulfilled, the coefficient associated with the fiscal position of the previous period being positive, thus indicating a high degree of persistence. Specifically, an increase of the primary deficit by 1% of GDP over the previous year determines a primary deficit of 0.23% of GDP in the current year. The cyclical fiscal position (0.61% of GDP for OLS and 0.83% of GDP for TSLS and GMM) shows a persistence above the discretionary one (0.27% of GDP for OLS and 0.21% of GDP for TSLS and GMM), suggesting that the primary balance is adjusting more slowly to cyclical developments, while the previous discretionary deficits are absorbed more rapidly. These observations are of considerable importance in the annual budgeting process.

The results confirm statistically relevant parameters for all three FRFs estimated, indicating the sustainability of public finances in CEE countries, despite the developments implied by the economic crisis. Moreover, comparing the obtained results of the methods engaged in this paper, at least in statistical terms, we can argue that the estimates do not differ substantially, the variables having an increased statistical significance. Also, the signs of the estimated coefficients are consistent and in line with the initial expectations, as can be seen in Tables 1, 2 and 3. Therefore, the coefficients are considered robust.

Note

- ⁽¹⁾ In econometrics, endogeneity is defined as the situation where an explanatory variable is correlated with the error term. Common causes of endogeneity are represented by the existence of an uncontrolled variable that determines both the evolution of the dependent variable and the explanatory variables in the model, respectively the existence of a causal relationship between the dependent and independent variables in the model.

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