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PROCYCLICAL AND COUNTERCYCLICAL FISCAL POLICIES IN NON-EURO EU MEMBER COUNTRIES¹

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Abstract

The aim of this study is to determine the nature of the discretionary fiscal policy practiced by the non-euro EU member states, namely to deduce some bias for one of the two types of fiscal policies - procyclical or countercyclical. For this purpose, we used time series for the period 1995-2020, of the cyclically-adjusted primary balance, the output gap, as well as additional indicators - public debt, fiscal rules index and election years. From the signs and magnitude of the correlation and regression coefficients, it results that almost all countries have learned the necessary lessons from the economic / financial crisis, in order to move from a procyclical policy, during 1995-2008, to a countercyclical policy, in 2009-2020.

Keywords: discretionary fiscal policy, fiscal reaction function, procyclicality, countercyclicality, economic cycle

JEL Classification: H61, H62, E62, E65, E32.

1. Introduction

The aim of this study is the numeric assessment of the relation between the fluctuations of the economic cycle and the discretionary fiscal policies practiced during the last quarter of a century by the group of eight EU member countries outside the euro area of which Romania belongs to.³ Enhancing and mitigation of these fluctuations can be consequences of the types of fiscal policies, procyclical or countercyclical, respectively. The question we seek

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³ The analysed group is formed by the following countries: Denmark (which opted out of the euro), Bulgaria and Croatia (which were accepted in the ERM II in 2020), Czech Republic, Hungary, Poland, Romania and Sweden. The last seven countries have been exempted from the participation in the European Monetary Union until they meet the access criteria to the EMU. In addition, Czech Republic did not sign the Stability and Growth Pact.

answer to is: “which of the two types of policies were preferred by the governments of the countries in this group?”.

A study focused on this group of countries is all the more necessary because, until now, the researchers’ attention has been focused mainly on the countries from the Economic and Monetary Union (EMU) where the application of a single monetary policy and a specific governance and budgetary policy were considered. Yet, as far as stability and growth are concerned, the mechanisms and legislation regarding the fiscal rules which derive from the Maastricht Treaty and the Pact of Stability and Growth are the same for both the countries in the euro area and the majority of the countries in the group of those outside the euro area. A feature of this last group of countries is its strong heterogeneity regarding the level of development, the efficiency of the institutional framework, bias towards a certain type of applied fiscal policies, etc.

The fiscal policy of a country has a procyclical character when the measures taken enhance the fluctuations of the business cycle or it has a countercyclical character when the measures mitigate the fluctuations. The procyclical fiscal policy manifests itself in different ways depending on the two stages of the business cycle:

- a) In the expansion stage (economic boom), some governments practice the procyclical solutions using as incentives the increase in public expenditure and reduction in taxes which leads to increase in demand, increase in public debt and rising public deficit; hence, the narrowing of the fiscal space, thus creating additional difficulties in implementing stabilization and recovery policies for the future post-crisis phase;
- b) In the recession stage, the procyclical politics manifests itself through restrictive, austerity measures – additional taxes and fees, reduction in public spending, reduction in salaries and pensions etc., which contributes to exacerbation of cyclicity by deepening the crisis, thus making difficult, postponing or even thwarting the future process of stabilization and economic recovery. “In bad times the cutting of fiscal spending can unbalance and even destroy the purpose of consolidation if it exacerbates the fall of output” (Alcidi *et al.*, 2016, p.2).

The main objective of the countercyclical fiscal policy is the mitigation of cyclical fluctuations and ensuring the economic and financial stability of the business cycle.

Learning from such shortcomings, during the first post-crisis years (2010-2013) the situation was remedied by revising the EU economic and financial legislation, either by introducing new regulations or by amending, supplementing or especially derogating from existing legislation on certain restrictions and norms of the financial-budgetary discipline and EU budget flexibility valid in the next bad times such as those caused by the Covid-19 pandemic.

In the following (Section 2) we revise the empirical literature on the countries’ practices and propensities for the procyclical policies or countercyclical ones and the role of the European fiscal regulations in mitigating budget balance fluctuations of the budgetary balances. In Section 3 we mention the literature sources and describe the methodology behind the tests, namely: the choice of specific indicators, according to their degree of correlation, used in applying simple correlation and the fiscal reaction function for the econometric analysis in different variants. In section 4 we move on to the phase of assessing the character of the discretionary fiscal policies – procyclical and countercyclical – by graphically describing and measuring the behaviour of specific indicators, of the relations between the discretionary policy component represented by the cyclically adjusted primary budget balance and the cyclical component represented by the output gap. To this end, we used graphical

representations and numerical determinations of the character of fiscal policies, applying simple correlation and econometric analysis with different variants.

2. Empirical Literature

The estimation of the fiscal policy reaction to the fluctuations of the business cycle is a topic of discretionary fiscal policy functions widely debated in the economic literature. These functions, as Alcidi, Gros and Thirion (2016) state, define the way in which the discretionary fiscal policy component representing the fiscal effort reacts to the cyclical changes in the GDP indicator and other determining factors (public debt, institutions' quality, elections, regulations etc.).

Noting a different correlation between different states of the fiscal balance (which define fiscal policy) and the output variations (which describe the business cycle), in the study "Fiscal Policy in Latin America", Gavin and Perotti (1997) used the fiscal policy reaction function to define the character of this policy – cyclical or countercyclical –, taking as the dependent variable the change in the fiscal balance in relation to the GDP and as the determinant variable the growth rate of the real GDP together with additional indicators regarding the lag of the balance (which characterizes the inertia of the system) and the terms of trade. The calculations were made for the entire period of the business cycles between 1970-1995 and the two stages of the cycles: the good period (upturn) and the bad period (downturn). The results of the regression calculations are highlighted by the signs – / + and by the values of the coefficients of the cyclical variable (output).

The bias of the developing countries regarding the procyclical fiscal policies is emphasized in many other studies based on wider research and more refined and in-depth instruments and analyses. Frankel *et al.* (2013), Vegh (2015) and others show that, in the period before 2015, approximately one third of the developing world managed to "escape the procyclicality trap" and to "graduate" to the category of countercyclical countries (Frankel *et al.*, 2013, p.32).

In revealing a lack of systematic behaviour of the discretionary fiscal policies of developed countries, including those in the euro area, Arpaia and Turrini (2008) etc., reveal the existence of an asymmetry of the discretionary fiscal policies throughout the business cycle. European Commission (2019), based on a great number of cases considered, unlike in the developing countries, shows that in the EU countries procyclicality is not so obvious and clear-cut. In this case, it is revealed either on certain periods and stages of the cycle or by using certain indicators and calculation models (techniques). For example, in the first decade after the transition to the EMU, there was a shift from the acyclical to the procyclical policy in the expansion stage of the business cycle. After the Great Recession of 2008-2009, following the improvement of the legislation regarding the implementation of fiscal rules, the fiscal policy applied manifested the general acyclical and countercyclical tendency by reducing the deficits and the public debt, as well as achieving the budgetary surpluses in the boom stage and by granting economic incentives for downturn-braking and reconstruction actions in the recession stage.

An issue widely debated in the empirical literature on cyclicity is that of the fiscal rules established by the EU countries through the Maastricht Treaty and the Stability and Growth Pact in order to avoid the excessive government deficits and the unrestrained increase in the public debt and not to jeopardize the financial and economic stability. Answering criticism claiming that the Maastricht Treaty and the Stability and Growth Pact did nothing but weaken the role of fiscal policy by preventing the governments of the EU countries from applying

countercyclical discretionary fiscal policies, Gali and Perotti (2003) emphasize the positive role of the rules imposed by such regulations as discretionary fiscal policies in the EU countries tend to become more countercyclical. Although tighter fiscal rules are linked to a tendency of deficit and public debt reduction, Baldinger and Reuter (2017), Burret and Feld (2018) etc. relativize the positive impact of the fiscal rules and restrictions on ensuring the countercyclical nature of the fiscal policy, considering they are still debatable – Debrun *et al.* (2008); Caselli and Reynaud (2019).

There were views that associated the procyclical nature of the discretionary fiscal policy with the implementation of fiscal rules that tend to amplify the cyclical fluctuations in output. In a recent study, Larch *et al.* (2020, p. ii) show that the explanations of such a connection are not convincing and that, in fact, "deviations from fiscal rules and accumulation of government debts fuel the procyclical fiscal policy". Huart (2011) brought forward this claim by the following data: 1) the increase in the frequency of countercyclical episodes relative to total episodes (procyclical and countercyclical) both in the good periods and in the bad ones (after the establishment of the euro area) reaches 71% and 100%, respectively; 2) the achievement of the positive sign of the correlation coefficient of the output gap estimated at 0.05 in the early period of the euro area.

Yet, the economic-financial crisis of 2008-2009 showed both the inflexibility of some basic economic regulations and the lack of regulations for possible bad times, dominated by crises and events out of decision-makers' control. Learning from the lesson of the crisis, in 2010-2013, the regulations derived from the Stability and Growth Pact were revised and supplemented in 2010-2013 and derogations from certain existing restrictive rules were made for exceptional situations or severe downturns out of the state's control. These measures support the implementation of countercyclical fiscal policy in bad times⁴.

Empirical literature reveals numerous justifying cases with respect to the procyclical tendency of fiscal policies. These include countries' lack of access to international credit markets in recession stages, corruption, tax reduction and increase in public expenditure in good times (Gavin and Perotti, 1997; Kaminsky *et al.*, 2004, etc.), the reduction in deficit by tightening fiscal policy without considering the cyclical conditions (stages), the voracity effect of multiple interest groups (Tornell and Lane, 1999). Alesina and Tabelini (1990), Persson and Tabelini (2001) show that the difficulty to ensure the sustainability of budget plans comes from the governments' propensity towards deficit, while this propensity is determined by the "problem of the commons" or the opportunistic strategic behaviour of the political decision-makers in power dominated by short term political interests, in order to get re-elected (Fatas and Mihov, 2009, p.289). The political competition of the parties and their short-term political interests are often an important source of procyclicality. Croitoru (2018) shows that, in order to get into power, opportunistic political parties express their magnanimousness to their voters through policies of increased public expenditure and tax reductions both in good times and in bad ones, but are inclined to keep away from power when unpopular tax-increasing and public expenditure reduction measures need to be taken.

⁴ Official Journal the European Commission, L306/35, 23.11.2011; European Commission, 2020, Communication from the Commission to the Council, on the Activation of the General Escape Clause of the Stability and Growth Pact, COM (2020) 123, final, Brussels, March 20.

3. Data and Methodology

The indicators and data used in our calculations and analyses are taken from: AMECO⁵ Database – fiscal variables, actual, potential and gap GDP, actual GDP – potential GDP; for the fiscal rules index data from Fiscal rules database (March 3, 2021)⁶ were used; for election years data from European election database⁷ and Wikipedia were used. The majority of statistical series used in the regression calculations cover the period 1995 – 2020, which provides a satisfactory number of observations. The countries included in the analysis are the EU members outside the euro area, namely Denmark, Bulgaria, the Czech Republic, Croatia, Hungary, Poland, Romania and Sweden.

At certain time intervals, national economies experience significant cyclical fluctuations both in production and in public finances through increases and decreases in GDP and fiscal (budget) balances, respectively, resulting in important economic losses and social costs.

In order to determine the nature or type of the fiscal (procyclical or countercyclical) policies applied so far in the EU countries as well as to apply certain countercyclical discretionary fiscal policies to mitigate the fluctuations and losses, a wide variety of calculation and analysis tools have been developed – new indicators and new models that have become operational. These tools concern, on the one hand, the characterization and measurement of cyclicity behaviour using the GDP indicators, the output gap etc., and, on the other hand, the characterization and assessment of the behaviour and answer of the budget balance and discretionary fiscal policies to cyclical changes.

The business cycle is described by increases and decreases in the actual GDP and its components, namely, both the fluctuating part (called the cyclical part) and the structural part, assessed by the production functions method and expressed by the potential GDP indicator. Subtracting from the actual GDP the calculated potential GDP gives the production gap. This indicator is used as a determinant factor in the fiscal reaction function, in defining the procyclicality and countercyclicality of the fiscal policies pursued by each country and in measuring the intensity degree of these policies. A positive change in the production gap means a mitigation of cyclical conditions, while a negative change in the production gap means a worsening of cyclical conditions (Larch *et al.*, 2020, p.10). Used as the determinant variable in relation with the cyclically-adjusted primary fiscal balance (as the dependent variable), as we will see below, a directly proportional change in the two indicators shows countercyclicality, while an inversely proportional one – procyclicality.

The relationships between the fiscal variables and the variables of the business cycle must be interpreted in terms of determining and sustaining the fiscal effort, which involves a rigorous definition and measuring of the determinants of fiscal policy and public budget balance components that are fully consistent with the objective set and the indicator of the business cycle represented by the production gap.

In different models of the regression calculations (variants of fiscal reaction functions) the dependent variable is considered either the cyclically-adjusted budget balance or the cyclically-adjusted primary budget balance (interest excluded). The argument for

⁵ https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/667e9fba-eea7-

⁶ https://ec.europa.eu/info/publications/fiscal-rules-database_en

⁷ https://o.nsd.no/european_election_database/country/

adopting the later indicator is that the interest on borrowing is a component outside control of the discretionary fiscal policy.

To answer the question “which of the two discretionary fiscal policies – procyclical or countercyclical – is most commonly practised by the EU member countries outside the euro area in each of the two stages of the business cycle – boom or recession?”, we analyse first, for each country, the comparative evolution of the time series of the most significant macroeconomic indicators. Then, we test the relationship between variants of the budget balance and the output gap resulted from the difference between the actual GDP and the potential GDP, using graphical representations, simple correlations and the fiscal reaction function taken in variants with different additional variables.

The fiscal reaction function commonly used in economic literature has the following form:

$$\text{CAPB}_t = C + \beta_1 \text{CAPB}_{t-1} + \beta_2 \text{GAP}_t + \beta_3 \text{DP}_{t-1} \quad (1)$$

where:

CAPB_t – cyclically-adjusted primary balance in year t (% in potential GDP);

CAPB_{t-1} – cyclically-adjusted primary balance in the previous year;

GAP_t – output gap (actual GDP – potential GDP, % in potential GDP);

DP_{t-1} – public debt of the previous year (% of the GDP);

C – constant;

β – elasticity coefficient parameter representing the numerical effect produced by one unit change in the determinant variable on the dependent variable CAPB.

In our case, the focus is on the relationship between the CAPB (the dependent variable) and the GAP (the determinant variable or factor), relationship represented by the β_2 parameter, whose sign defines the character of the discretionary fiscal policy applied in the analysed period (procyclical or countercyclical) and whose value measures the degree or intensity of this policy. Usually, these types of policies take on specific forms during boom periods versus recession periods.

In the boom period, when β_2 is positive, it means that with the increase in the GDP's output gap, the budget balance increased, thus we are dealing with consolidation. In this case, the policy is countercyclical. When the parameter is negative, the ascension of the GDP gap is accompanied by a fiscal loosening (balance decrease), thus the policy is procyclical.

In the recession time, when β_2 is positive, as the GDP gap falls, the budget balance also falls (fiscal loosening), so the policy is countercyclical. When β_2 is negative, the economic decline is accompanied by the increase in the budget balance (fiscal consolidation), so the policy is procyclical.

The majority of empirical studies emphasize the sensitivity of the cyclical variable parameter when the CAPB and GAP variables (called essential) are included in the model as level or as variances (differences), or when the model includes new determinant variables as well as different time periods.

In order to define the character (type) and to measure the value of the discretionary fiscal policies, we considered and tested the following variants in our analyses:

- Variant II (1), presented above through the equation (1) in which the dependent variable CAPB and the determinant factor GAP_t are included in the model as level;

- Variant II (2), in which the dependent variable $CAPB_t$ included in the model is taken as level, and the determinant factor GAP_t included in the model is taken as the annual difference (Δ – representing the difference between the two consecutive periods);

$$CAPB_t = C + \beta_1 CAPB_{t-1} + \beta_2 \Delta GAP_t + \beta_3 DP_{t-1} \quad (2)$$

- Variant II (3), in which both the dependent variable, $CAPB_t$, as well as the determinant factor GAP_t variable are included in the model as annual differences;

$$\Delta CAPB_t = C + \beta_1 CAPB_{t-1} + \beta_2 \Delta GAP_t + \beta_3 DP_{t-1} \quad (3)$$

Variant II (4), in which the dependent variable $CAPB_t$ and the determinant variable GAP_t were included in the model as levels, but a new determinant factor, FRI_t (fiscal rules index), was included in the model;

$$CAPB_t = C + \beta_1 CAPB_{t-1} + \beta_2 GAP_t + \beta_3 FRI_{t-1} + \beta_4 GAP_t FRI_t + \beta_5 DP_t \quad (4)$$

Variant II (5), in which the dependent variable $CAPB_t$ and the determinant variable GAP_t were included in the model as levels and another determinant factor, the election years, EY_t , as dummy variable with values 1 in election year and 0 in the rest of the years);

$$CAPB_t = C + \beta_1 CAPB_{t-1} + \beta_2 GAP_t + \beta_3 EY_t + \beta_4 GAP_t EY_t + \beta_5 DP_{t-1} \quad (5)$$

Variant II (6), panel econometric analyses including the 8 countries were performed for the equations in the variants (1), (4) and (5) described above.

4. Evaluation of Results

4.1. Description and Evaluation of Behaviour of Some Specific Indicators and Discretionary Fiscal Policies

Before estimating some fiscal reaction functions for determining and measuring the types of discretionary fiscal policies practised by the 8 countries, it is necessary to take a look and explain the evolutions of some specific indicators and point out the significance and proportion of these evolutions, including some simple correlations between them. The reference is, in the first place, to the discretionary fiscal components of the budget balance type (budget balance and cyclically-adjusted primary budget balance) and, secondly, the cyclical component, the output gap and the annual GDP growth rate. The complete series (1995 - 2020) of these indicators are used in our analysis.

Regarding the budget balance: the data on the evolution of the indicators from the 26 years period (1995 – 2000) show two group of countries with inclinations towards different discretionary fiscal policies: 5 countries (Czech Republic, Croatia, Hungary, Poland and Romania) inclined towards budget deficits and excessive budget deficits and 2 countries (Denmark and Sweden) inclined towards balanced budgets and surpluses. Bulgaria differs from these countries by its special status as a member of the Monetary Council. Table 1 shows the number of years (of the 26 included in the statistical series) in which each country had budget deficits, excessive deficits, budget surpluses and cyclically-adjusted primary budget deficits.

Table 1. Number of Years (of the 26 Total) of Budget Deficits and Surpluses Practised by the EU Countries Outside the Euro Area, 1995-2020

Number of years:	Bulgaria	Czechia	Croatia	Hungary	Poland	Romania	Denmark	Sweden
With budget deficit, of which:	13	20	20	26	26	26	13	11
- with excessive deficit	6	12	13	16	19	16	2	3
With budget surplus	13	4	6	0	0	0	12	13
With cyclically-adjusted primary budget deficit	6	18*	14**	12	23	16	0	2

* - out of a total of 23 years;

** - out of a total number of 19 years.

Source: Calculation based on AMECO data.

Hungary, Poland and Romania had budget deficits in all the 26 years included in the data series and excessive deficits in the majority of the years, in 19, 16 and 16 years, respectively. Severe deficits occurred in most countries not only in bad (downturn) times, but also in good (upturn) times, which often lead – as we shall see later – to exacerbation of cyclicity and narrowing of the fiscal space, with negative consequences for the implementation of the economic recovery policy.

Regarding the relationships between the cyclical components of production and the discretionary ones of the budget balance: the relationships between the mentioned components of each country are expressed by the correlation coefficients in Table 2 and described by the 9 graphs in Figure 1.

In order to see to what degree the lessons of the economic-financial crisis have changed the decision-makers' views on the character of fiscal policy, we calculated and included in Table 2 the correlation coefficients between the cyclically adjusted primary budget balance (CAPB) and the GDP gap (GAP) both for the entire period 1995 – 2020 and separately for the periods before the major crisis 1996 – 2008 and after the major crisis, 2009 – 2020.

The first period analysed, 1995 – 2008, shows a strong procyclical character (-0.9 correlation) of the budget balance in Hungary and Romania, and a lower one in Bulgaria and Poland. However, in Croatia and Denmark the fiscal policy is significantly countercyclical, while in Sweden and the Czech Republic the evolution of the budget balance is acyclical.

In the second period, 2009 – 2020, the countercyclical character of the fiscal policy is evident in Bulgaria, as well as in the Czech Republic, Croatia and Denmark. In Poland and Romania, the fiscal policy is acyclical, while in Sweden it has a character close to acyclical. According to calculations, Hungary is the only country that maintains a significantly procyclical fiscal policy.

Table 2. Correlation Coefficients between the Cyclically-adjusted Primary Budget Balance and the GDP Gap

Country	Period	1995-2020	1995-2008	2009-2020
Bulgaria		-0.056	-0.523	0.748
Czechia		0.016	0.016	0.519
Croatia		-0.128	0.766	0.526
Hungary		-0.624	-0.912	-0.488
Poland		-0.187	-0.308	-0.118
Romania		-0.364	-0.901	0.054
Denmark		0.720	0.652	0.435
Sweden		0.199	0.156	-0.258
Average		-0.053	-0.323	0.178

Source: Authors' calculations based on AMECO online data.

For the entire period, 1995 – 2020, there may be noticed a significant countercyclical character of the fiscal policy in Denmark (0.72) and, respectively, procyclical in Hungary (-0.62).

To reveal the general correlation between the cyclically-adjusted primary budget balance (CAPB) and the GDP gap (GAP) for the whole group, in Figure 1 we cumulated the data for all the 8 EU member countries outside the euro area. The graphs present separately the time intervals 1996 – 2000, 1996 – 2008 and 2009 – 2020, as well the correlation variants between variables taken as level and as differences, respectively, $CAPB \leftarrow GAP$, $CAPB \leftarrow \Delta GAP$ and $\Delta CAPB \leftarrow \Delta GAP$ corresponding to the equations (2) and (3) described in the previous section.

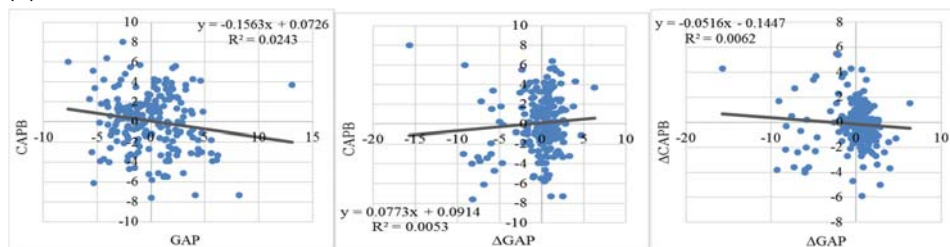
Differences can be noticed both between periods and between the considered variants. For the whole period 1996 – 2020, the shape of the point cloud as well as the almost horizontal trends show an acyclical relationship between the two variables; the sign of the correlation, given by the direction of the regression line, is different in the 3 variants: negative, positive, and negative, respectively. The lack of a significant correlation for the entire period is given by the different signs of the β coefficients both between the two periods (Figure 1 b-c) and between the countries. For the period 1996 – 2008, preceding the economic-financial crisis, the trends are similar between variants and clearly downward, leading to the hypothesis of a negative correlation, i.e., a procyclical policy in this period.

For the period (2009 – 2020), following the economic-financial crisis, the trends are upward in two of the 3 variants showing a shift of several countries' position in favour of the countercyclical fiscal policy.

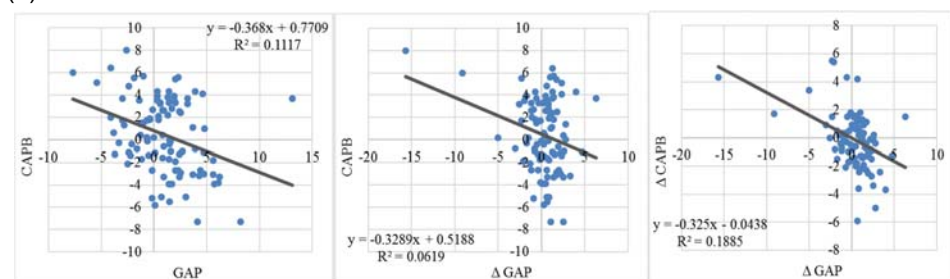
In the following section, we shall use econometric analysis to comment and compare the new results to the ones above.

Figure 1. Correlations between the Cyclically-adjusted Primary Budget Balance (CAPB) and the GDP Gap (GAP)

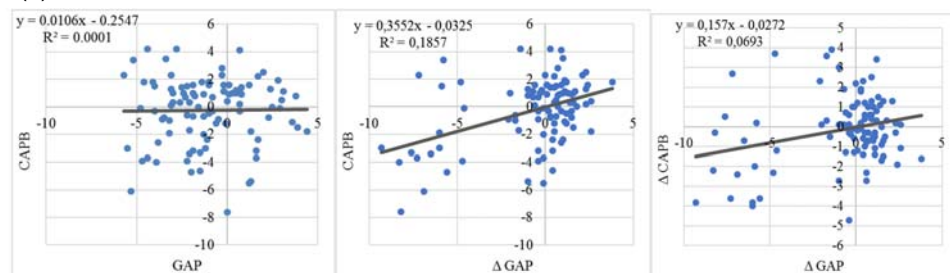
(a) 1996-2020



(b) 1996-2008



(c) 2009-2020



Source: Authors' calculations based on AMECO online data.

4.2. Econometric Analysis

In Figure 1 correlations, it may be noticed that the R^2 determinacy of the presented equations is very reduced showing that the variation in the GDP gap explains only a small part of the variation in the cyclically-adjusted primary budget balance. For this reason, an econometric analysis to include the variation of other determinants is necessary. Of these, as shown in the equations detailed above, an important role in explaining the variation of the cyclically-adjusted primary budget balance, $(CAPB_t)$, is also played by its' previous year's level $(CAPB_{t-1})$, which expresses initial circumstances or system inertia, as well as the previous year's public debt (DP_{t-1}) , fiscal rules (FRI_t) , general elections or election year (EY_t) .

In Appendices 1 and 2 of the study we present the results of the regression calculations corresponding to the variants II (1) and II (6). We mention that, considering the reduced data sample and the high number of factors used, in the econometric analysis we used only the series of data for the entire period 1996 – 2020, abandoning the use of shorter time series – before and after the 2008 – 2009 crisis. Even for the whole period, we consider that the regression results remain highly relative, making the following analysis rather exploratory and general in terms of purpose.

In Table 3 we compared the correlation coefficients in the previous table with the values of the regression coefficients of the GDP gap (GAP variable) in the equations (1)-(5), for each of the 8 analysed countries. It is noticeable that the introduction of additional factors in the regression equations leads in some cases to signs of the GAP parameters contrary to the signs of the correlation coefficients (the case of Bulgaria and Croatia). Similarly, differences regarding the signs of the GAP parameters occur between the variants of the econometric equations as well. This fact is caused by the lack of statistical significance of the parameters in the regression equations, generated, in its turn, by the reduced number of observations.

Table 3. Correlation Coefficients versus Regression Coefficients of the Output Gap Determined by the Relationships between the CAPB_t and GAP_t Variables, 1995-2020

Countries	Bulgaria	Czechia	Croatia	Hungary	Poland	Romania	Denmark	Sweden
Variants								
I. Correlation coefficients SPA _t ← GAP _t	-0.056	0.016	-0.128	-0.624	-0.187	-0.364	0.720	0.199
II. Regression coefficients								
(1) CAPB _t ← GAP _t and CAPB _{t-1} ; DP _{t-1}	0.107 (0.485)	0.048 (0.670)	0.149 (0.123)	-0.284 (0.116)	-0.089 (0.502)	-0.295 (0.004)	0.385 (0.003)	0.010 (0.909)
(2) CAPB _t ← ΔGAP _t and CAPB _{t-1} ; DP _{t-1}	0.024 (0.856)	0.208 (0.084)	0.188 (0.036)	-0.198 (0.267)	0.197 (0.222)	-0.195 (0.172)	0.286 (0.078)	-0.128 (0.155)
(3) Δ CAPB _t ← ΔGAP _t and CAPB _{t-1} ; DP _{t-1}	0.179 (0.309)	0.252 (0.088)	0.136 (0.294)	-0.308 (0.130)	0.172 (0.289)	-0.244 (0.049)	0.329 (0.064)	-0.010 (0.929)
(4) CAPB _t ← GAP _t and CAPB _{t-1} ; FRI _t ; GAP _t * FRI _t ; DP _{t-1}	0.076 (0.551)	-0.388 (0.774)	0.046 (0.607)	-0.312 (0.351)	-0.203 (0.329)	-0.340 (0.004)	1.013 (0.038)	-0.453 (0.146)
(5) CAPB _t ← GAP _t and CAPB _{t-1} ; EY _t ; GAP _t * EY _t ; DP _{t-1}	0.096 (0.589)	0.154 (0.250)	0.021 (0.814)	-0.185 (0.310)	-0.078 (0.632)	-0.349 (0.002)	0.291 (0.042)	0.015 (0.878)

Note: *p*-values of *t*-test in brackets;

Source: Data in Table 2, authors' calculations.

Next, we shall analyse the results of each equation variant.

A. Budget Balance, GDP Gap and Public Debt

Here are also included and analysed the variants of equations (1), (2) and (3) presented in the section above, in which the cyclically-adjusted primary budget balance (CAPB_t) depends on the cyclically-adjusted primary budget balance of the previous year (CAPB_{t-1}), the GDP gap (GAP_t) and the public debt of the previous year (DP_{t-1}).

In variant II (1) of the regression coefficients (Table 3 and Appendix 1) one may see that the sign corresponding to the GAP coefficients reveals a procyclical policy in Poland, Romania and Hungary and a countercyclical policy in Bulgaria, the Czech Republic, Croatia, Denmark and Sweden. Yet, the coefficients are statistically insignificant for most countries except for Romania and Denmark.

As for the public debt (DP), its coefficient is theoretically positive, meaning that an increase in the public debt in the previous year should be a warning signal to an increase in the budget balance (a higher surplus or a lower deficit). The results confirm this, in the sense that the sign of DP coefficients is positive in most countries (except for Romania and Denmark), so we can state that the increase in the public debt leads to fiscal consolidation.

Using the variants of the equations (2) and (3) in Table 3, in which the output gap is included in the equation as a difference from the previous year (ΔGAP), leads to a change in the coefficients, from negative to positive (countercyclical policy) in the case of Poland, from positive to negative, respectively (procyclical policy), in the case of Sweden. The parameters of the ΔGAP determinant stay mostly insignificant, which confirms that the size of the GDP gap does not influence the value of the budget balance.

B. Fiscal Rules Index and Election Year

In the variants (4) and (5) of equations we included, successively, two additional factors: FRI (fiscal rules index) and EY (election year – dummy variable 1/0). These factors were introduced in equations both separately and multiplied by the GAP variable in order to show their influence on the CAPB←GAP relationship.

$$CAPB_t = C + \beta_1 CAPB_{t-1} + \beta_2 GAP_t + \beta_3 FRI_{t-1} + \beta_4 GAP_t FRI_t + \beta_5 DP_{t-1} \quad (4)$$

$$CAPB_t = C + \beta_1 CAPB_{t-1} + \beta_2 GAP_t + \beta_3 EY_t + \beta_4 GAP_t EY_t + \beta_5 DP_{t-1} \quad (5)$$

The coefficient β₄ shows in what sense and to what extent each of the two factors influence the relationship between the CAPB and the GDP gap (the character of the fiscal policy), as follows:

$$\partial CAPB / \partial GAP = \beta_2 + \beta_4 FRI \quad (8)$$

$$\partial CAPB / \partial GAP = \beta_2 + \beta_4 EY \quad (9)$$

Theoretically, the fiscal regulation FRI should contribute to the limitation of government expenditure and to fiscal consolidation (the increase in CAPB) which would lead to a positive sign of the β₃ parameter. In the case of the election year, the effect is the opposite: in the respective period, fiscal relaxation usually occurs (decrease in CAPB – negative β₃).

In variant II (4) of Table 3 we introduced the fiscal regulations index, FRI. The results show that the sign of FRI and GAP*FRI differ from one country to another. FRI coefficient is positive (but statistically insignificant) in only 3 of the 8 countries (Czech Republic, Poland, Sweden), so, we cannot state that fiscal relaxation leads to consolidation, according to the theory. The results depend not only on the number of regulations, but also on their quality, as well as the way in which they are practised or enforced.

However, the coefficient $GAP \cdot FRI$ is positive in 5 countries – with high values in Bulgaria and Sweden and lower in Croatia and Hungary –, which shows a tendency of fiscal regulations to favour the countercyclical fiscal policies in the two mentioned countries. These results are only indicative, as the estimated parameters are not statistically significant.

In variant II (5) we considered the electoral years, EY , a dummy variable with value 1 in electoral years and 0 in the rest of the years. The negative sign of EY , in 5 of the 8 countries (Bulgaria, Croatia, Romania, Hungary, Sweden), confirms that the electoral year leads to fiscal relaxation, as expected.

Yet, the $GAP \cdot EY$ sign is negative in only 4 cases (Bulgaria, the Czech Republic, Poland, Hungary), which shows that in these countries only the hypothesis that electoral years favour the procyclical policy is verified. In the other 4 countries, the influence of the electoral year on the relationship $CAPB \leftarrow GAP$ is a positive one (countercyclical policy). As with the FRI , there is a lack of statistical significance of the EY parameters.

C. Panel Analysis

In Appendix 2 we analysed a panel of the 8 countries over the period 1999 – 2020. The high heterogeneity between countries regarding the coefficient of the factor variables, as seen in the country analyses, does not recommend a panel analysis. However, the much higher number of observations, as compared to the country analyses, allows the tracing of a general tendency of the form of the correlation of the dependent variable factors, *i.e.*, the approximation of a coefficient average of the 8 countries.

The regression calculations use both the simple and the general variant of LSM⁸ (OLS and WLS) – in order to approach the problem of heteroscedasticity specific to cross-sectional analyses. The results of the calculations show negative coefficients for the GAP factor, statistically significant in all variants of the equations, which clearly reveals a general procyclical policy of the analysed sample, with significant deviations for some countries as seen in Table 2 and Table 3. Also, the influence of the previous year's public debt, too, is statistically significant, and the coefficients are positive, as according to the theory.

Regarding the fiscal regulations index (FRI), the FRI coefficient is positive, which shows that fiscal regulation leads to fiscal consolidation, but statistically insignificant. Yet, the $FRI \cdot GAP$ coefficient is significant and positive, sign which confirms the countercyclical effect of regulations.

With respect to election years, EY , for the whole group of countries the EY coefficient is significant and negative, which confirms the effect of fiscal loosening specific to election periods. Still, the $EY \cdot GAP$ is positively close to zero, and the probabilities associated with the t-test show the lack of significance of the influence of election year on the $CAPB \leftarrow GAP$ relationship (the character of the fiscal policy) for the whole sample. This lack of statistical significance, noticed in some cases, is also caused by the high heterogeneity of the parameters across countries (including different signs), as seen in the analyses of equations (1)-(6).

5. Conclusions

A simple look at the statistical series shows that some countries (Hungary, Poland, Romania) prefer running budget deficits and others (Bulgaria, Denmark and Sweden) prefer running consistent budget surpluses. These practices are reflected over time by the variation in

⁸ The least-squares method.

fiscal position (represented by the dependent variable, cyclically-adjusted primary budget balance) on which the shocks of output variation (represented by the determinant variable, the GDP gap) are generated.

2. From signs and magnitude of the correlation coefficients (Table 2 and graphs in Figure 1) it appears that most countries learned the lessons of the 2008-2009 crisis, moving from a procyclical policy to a countercyclical policy. This fact is confirmed both by the change – between the two periods – in the correlation coefficients calculated for each country – and the change in the average coefficient calculated for the whole group of countries, from -0.323 in 1995 – 2008 to + 0.178 in 2009 – 2020 (Table 2).
3. In the calculations, we assessed the response of the change in the discretionary fiscal policy's character: (i) to the shift from a variant regarding the level to another variant regarding the one-to-one year difference of the cyclically adjusted primary budget balance and the GDP gap (namely $CAPB \leftarrow GAP$; $CAPB \leftarrow \Delta GAP$; $\Delta CAPB \leftarrow \Delta GAP$); (ii) between the time periods (1995 – 2008, 2009 – 2020 and 1995 – 2020). In this approach we appealed to the general correlation, at the group level, between the two essential indicators, by cumulating the data of the 8 countries. According to the results obtained and illustrated graphically in Figure 1, the correlations show the following trends: between 1996 – 2008, a procyclical trend for all three variants of indicators; between 1996 – 2008, some contradictory trends for the variants of variables; between 2009 – 2020, a countercyclical trend for the three variants.
4. Since, in the case of the simple correlation, the GDP gap (GAP) variant explains only a part of the cyclically-adjusted primary budget balance variant, the econometric analysis using the fiscal reaction function which includes other determinant factors – public debt, fiscal regulations, general elections etc. – becomes necessary. Table 3 presented, for the entire period 1995 – 2020, the results regarding the sense and the magnitude of the shocks produced by the change in the GDP gap to the cyclically-adjusted primary budget balance for six variants, of which: one with correlation coefficients and five with regression coefficients – which include significant additional factors. The table shows that Hungary's fiscal policy had a procyclical character in all six variants, Romania in five variants, Poland in four, Sweden in three, while Bulgaria, the Czech Republic and Croatia in one variant each. Denmark is the only country which displays a countercyclical policy in all six variants.

It needs to be pointed out that, according to the data in Table 2, the fiscal policies in Romania and Bulgaria shifted from a strong procyclical character in 1995 – 2008 to a mildly and, respectively, moderate countercyclical environment in 2009 – 2020, as a result of the lessons learned from the economic-financial crisis of 2008 – 2009.

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Appendix 1

**Regression Coefficients of Output Gap and Public Debt
for EU Member Countries Outside the Euro Area, 1996-2020, Equation (1)**

Factors	Dependent variable: CAPB t							
	Bulgaria	Czechia	Croatia	Hungary	Poland	Romania	Denmark	Sweden
CAPB t-1	0,052 (0,828)	0,524 (0,004)	0,294 (0,083)	0,369 (0,026)	0,630 (0,003)	0,843 (0,000)	0,007 (0,974)	0,453 (0,001)
GAP t	0,107 (0,485)	0,048 (0,670)	0,149 (0,123)	-0,284 (0,116)	-0,089 (0,502)	-0,295 (0,004)	0,385 (0,003)	0,010 (0,909)
DP t-1	0,086 (0,011)	0,093 (0,018)	0,083 (0,001)	0,140 (0,015)	0,030 (0,534)	-0,028 (0,404)	-0,003 (0,941)	0,089 (0,000)
C	-1,715 (0,054)	-3,682 (0,009)	-6,043 (0,001)	-9,820 (0,014)	-2,129 (0,354)	0,278 (0,767)	2,965 (0,114)	-2,970 (0,002)
R ²	0,603	0,619	0,784	0,667	0,398	0,735	0,531	0,762
DW	1,983	1,935	1,847	1,514	1,218	1,535	1,992	1,708
No.obs.	23	23	19	25	25	25	20	25

Note: In brackets we wrote the p-values associated with the t-test.

Source: Authors' calculations based on AMECO online data.

**Regression Coefficients of Output Gap and Other Determinants - Panel
Analyses with the 8 Non-euro EU Member Countries, 1996-2020, Equation (6)**

Method	Dependent variable: CAPB t							
	OLS ¹	EGLS (Cross-section SUR) ²	OLS ¹	EGLS (Cross-section SUR) ²	OLS ¹	EGLS (Cross-section SUR) ²	OLS ¹	EGLS (Cross-section SUR) ²
Factors								
CAPB t-1	0,761 (0,000)	0,774 (0,000)	0,699 (0,000)	0,738 (0,000)	0,767 (0,000)	0,781 (0,000)	0,709 (0,000)	0,745 (0,000)
GAP t	-0,096 (0,036)	-0,140 (0,001)	-0,168 (0,000)	-0,153 (0,000)	-0,107 (0,050)	-0,164 (0,000)	-0,177 (0,001)	-0,160 (0,000)
FRI t			0,176 (0,114)	0,073 (0,399)			0,180 (0,102)	0,072 (0,397)
FRI t * GAP t			0,142 (0,003)	0,152 (0,000)			0,138 (0,003)	0,162 (0,000)
EY t					-0,686 (0,015)	-0,557 (0,007)	-0,619 (0,017)	-0,522 (0,007)
EY t * GAP t					0,050 (0,596)	0,063 (0,342)	0,048 (0,601)	0,062 (0,367)
DP t-1	0,015 (0,027)	0,014 (0,020)	0,014 (0,029)	0,014 (0,012)	0,015 (0,032)	0,013 (0,017)	0,013 (0,040)	0,013 (0,014)
C	-0,847 (0,011)	-0,620 (0,040)	-0,717 (0,023)	-0,599 (0,034)	-0,638 (0,059)	-0,451 (0,124)	-0,514 (0,111)	-0,407 (0,150)
R ²	0,658	0,722	0,722	0,807	0,670	0,742	0,731	0,815
DW	1,765	1,930	1,797	1,892	1,806	1,946	1,838	1,908
No. obs.	185 ³	185 ³	177 ³	177 ³	185 ³	185 ³	177 ³	177 ³
No. countries	8	8	8	8	8	8	8	8
No. years	25	25	24	24	25	25	24	24

¹ OLS; ² EGLS, estimated (generalized) least squares method with weights calculated by the SUR (seemingly unrelated regressions) cross-sectional method, which solves both the problem of cross-sectional heteroscedasticity and the problem of cross-sectional error correlation (confirmed by testing); ³ unweighted sample.

Note: In brackets we wrote the p-values associated with the t-test.

Source: Authors' calculations based on AMECO online data.