5. CYCLICALITY OF FISCAL POLICY IN THE EUROPEAN UNION

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Abstract

Our paper analyzes the way in which fiscal policy works across the phases of the economic cycle, more precisely it checks the pro-cyclical features of this policy. The sample we have chosen includes the EU countries, except for Cyprus and Malta, for the 1995-2014 period. To measure the pro-cyclicality and the way in which fiscal policy responds to economic, social and political stimuli we used multiple regressions, tested for time-series for each country at a time, as well as for panel data for the entire sample. We started from an a-priori premise that the developed countries lead a non-cyclical/counter-cyclical policy, whereas the developing countries have a pro-cyclical one; yet, the analysis of the fiscal policy instruments adopted during the analyzed period showed that this particular insight is not necessarily valid for all the cases. We have found that throughout the entire analyzed period, most of the countries led a pro-cyclical fiscal policy, no matter if they were developed or developing countries. The influence the policy variable has upon the fiscal policy cyclicality is a constant result across the entire study.

Keywords: fiscal policy, cyclicality, public expenditure, business cycle
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1. Introduction

Fiscal policy is one of the most important components of government's economic policy and it has the capability to influence the economic development of any given country. Numerous studies from reference literature have msdinca@yahoo.com approached the ways of improving fiscal policy's efficiency and, especially, of correlating this policy with the economic cycle's phases. Adjusting the fiscal policy to the phases of the economic cycle and the proper

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use of fiscal instruments supports the sustainability of public finances and stimulates economic growth.

Reference literature hosts many definitions of public finances sustainability and, particularly, of fiscal sustainability.

Blanchard *et al*. (1990) defines fiscal sustainability as a good management of resources. However, sustainability also refers to the effects of current fiscal policy, and in particular to avoiding the accumulation of excessive public debt.

Fiscal sustainability also entails a fiscal policy which does not induce distortions inside the economic system, does not create significant growth of public debt and of taxation levels and also does not generate a drastic reduction in budgetary expenditures. Most fiscal sustainability definitions also refer to fiscal policy's capability to keep constant or even reduce public debt as share of the GDP as compared to previous periods.

Sustainability can be also threatened when government revenues are insufficient to allow financing the costs associated with new public debt. Fiscal policy sustainability is sometimes associated with government's financial solvency (Afonso, 2005).

Our current research analyzes the way in which fiscal policy acts across economic cycle's phases and checks the pro-cyclicality features of this policy to identify the fiscal policy's instruments which have a negative influence upon the economic growth.

The research is structured as follows: the first section presents a short reference literature review, section two introduces the methods and materials used in the analysis and a statistical data analysis and methods' testing, whereas the third section presents empirical results and discussions. The research is finalized with conclusions.

2. Literature Review

Modelling fiscal policy' effects has gained momentum in recent years, as fiscal policy seemed to exert an ever-growing impact upon economic stability.

The economists' approaches concerning the fiscal policy's influence upon the economy are often different and even contradictorily, their studies referring to different impact areas of public taxes and expenditures.

The endogenous economic growth models stress the important role the fiscal policy plays for a country's economic growth (Stokey and Rebelo, 1995). However, Easterly and Rebelo (1993) noticed that endogenous models tend to internalize aspects which are rather generated by external factors. As a result, endogenous models consider that the long-term growth is influenced by welfare policies (King and Rebelo, 1990). On the other hand, Engen and Skinner (1996) noticed a significant connection between taxation policy and economic growth. In an empirical study, they noticed that a reduction by 2.5% in the level of taxation rates will generate an extra 0.2-0.3% economic growth. Although the response of economic growth is not proportional with the lowering of taxation rates, the above-mentioned authors state that in the long run the respective modification influences a country's living standard.

The neoclassical models recognize the importance of fiscal policy only during transition periods, considering that population dynamics and technological progress are factors that permanently influence the fiscal policy (Easterly and Rebelo, 1993; King and Rebelo, 1990).

Myles (2000) observed, after studying a group of developed countries, an increase in the taxation revenues, while the economic growth kept rather stable, concluding that taxation has a minor effect upon economic growth.

At the same time, constant rate exogenous technological changes are associated with linear economic growth (King *et al*., 1988), whereas infrastructure and technology investments appear to have a high profitability (Easterly and Rebelo, 1993). In what regards the population's evolution, an increase in this factor is sometimes associated with a decrease in GDP per capita because, at least on short term, the total factor productivity decreases (Mankiw *et al*., 1992).

Both the traditional Keynesian approach and that of Ricardo foresee a stabilizing and neutral role for the fiscal policy and it is expected that this should not be pro-cyclical (Balassone and Kumar, 2007). In a Keynesian model, an increased governmental consumption would support the growth of aggregated demand and, subsequently, the increase in the final output. Under these circumstances, the anti-cyclical fiscal policy should be the most effective.

The neoclassical models consider optimal the a-cyclical fiscal policy. This implies keeping the taxes constant across the entire economic cycle (Barro, 1979). Whenever government consumption substitutes a part of the private consumption, the anti-cyclical fiscal policy should be more effective. According to the neoclassical theory of fiscal policy, the ratio of government spending to GDP should behave counter-cyclically.

However, pro-cyclicality continues to influence a series of countries, especially the developing and emergent ones. For example, in Latin America, Gavin and Perotti (1997) have found that during the economic growth periods, pro-cyclicality determined an increase in the government budgetary surplus by 0.25% for each 1% growth in the level of the GDP. At the same time, during recessionary periods this approach deepens the crisis, determining an almost 1% increase in the deficit for a 1% decrease in the GDP. Ilzetzki and Vegh (2008) analyzed via several types of econometric models the fiscal policy's pro-cyclical effect upon the economic cycle, as well as the reverse causality between the two factors, a hypothesis subsequently unconfirmed. For the developed countries' sample chosen by the two researchers, the GMM regression determined that their fiscal policy had an a-cyclical character, whilst the VAR and OLS regressions seemed to indicate the presence of pro-cyclicality, contrary to previous findings. Similarly, Lane (1998) showed that Ireland's fiscal policy did not display a usual anti-cyclically pattern.

Strawczynski and Zeira (2011) have estimated whether "the cycle is the trend" for 23 emerging markets and 22 OECD economies. Their results suggest that while both the developed and the emerging countries have a pro-cyclical policy for investment expenditures, pro-cyclicality is also present in the emerging countries for government consumption and transfers. They also found that, in the countries with high levels of foreign direct investment, pro-cyclicality is milder.

Frankel *et al*. (2013) compared industrialized and developing countries as they employed fiscal policy to control business cycles. They found that the developed countries followed mainly countercyclical and sometimes a-cyclical policies, whereas the emerging and the developing countries employed pro-cyclical fiscal policy. However, during the last 10 years, many developing countries dropped pro-cyclicality and adopted counter-cyclical policies. The authors appreciated that the quality of public institutions is essential for facilitating any given country's move toward counter-cyclical fiscal policies. Talvi and Vegh (2005) appreciated that the developed countries apply an a-cyclical policy, whereas the developing countries practice a pro-cyclical fiscal policy.

Pro-cyclical fiscal policy can inhibit long-term economic growth, especially in the countries with a low level of financial intermediation (Aghion and Marinescu, 2007; Aghion, Hemous and Kharroubi, 2009), and it also reflects its own vulnerability (Stoian *et al*., 2018). Stoian *et*

al. (2018) have developed a framework to evaluate fiscal vulnerability for a panel of 28 EU countries, concerning the 1990-2013 period. The results they obtained showed that the Czech Republic, Greece, France, Italy, Malta, Portugal and the United Kingdom registered the highest scores of fiscal vulnerabilities during the analyzed period.

Fiscal pro-cyclicality, excessive deficits, faulty budgetary structure and poor compliance with the budgetary rules were also studied by Eyraud *et al.* (2017) in a study realized on a sample of 19 Euro-zone countries, covering a 16-year period.

The European public finances cyclicality was also analyzed by Hallenberg and Strauch (2002), who showed that taxes fluctuate counter-cyclically in a conventional manner and that discretionary measures tend to undermine the automatic stabilizers. They have also discovered that public investments have consistently displayed a pro-cyclical scheme. Moreover, the dynamic analysis showed that an output shock induced asynchronous taxes' and public expenditures' fluctuations in the year of the respective shock as well as in subsequent years.

Lewis (2009) has researched cyclicality, inertia and EU accession effects upon the Central and East European countries' fiscal policies, using time series. His results show that budgetary balances react in the direction of stabilizing the economic activity, are less inert as compared to the ones from Western Europe and the EU accession process induced fiscal losses for the countries from this region starting with 1999.

Turrini (2008) has analyzed fiscal policy's cyclical behavior for a 25-year period for a sample made of the Euro area countries. His results show that fiscal policy is pro-cyclical during economic growth periods, whereas for the recession periods he did not obtain solid results in support of the cyclical errors theory.

In a survey-based analysis, Debrun *et al*. (2008) suggest that introduction of the European fiscal framework and the country-specific fiscal governance features have played a part in the introduction of numerical fiscal rules, and the impact of those rules was statistically significant, robust and quantitatively important. Although the results and rules may be influenced by unobserved political factors, the reality suggests that these fiscal rules are associated with less pro-cyclical fiscal policies.

Gechert and Rannenberg (2014) have analyzed public expenditures' multiplying effect for the economic slowdown periods, applying a meta-regression for a dataset composed of 98 empirical studies. The results showed that the expenditures' multiplying effect grows significantly during the recession periods, outgrowing the taxes' multiplying effect, and that a tax-based fiscal consolidation is necessary.

The fiscal policy effects upon Romania's real GDP growth were also studied by Dumitrescu (2015), using VAR and structural VAR. His results showed low values of fiscal multipliers, however, with significant variations between the boom and the recession periods. The fiscal multipliers were found to be higher during the recession periods as compared to the expansion periods, according to author's opinion and results.

Jaimovich and Panizza (2007) proposed a new instrument for GDP growth and showed that, once GDP growth was properly instrumented, pro-cyclicality tended to disappear.
Outlying the pro-cyclical feature of developing countries' fiscal policies, the studies started to focus on factors which contributed to setting a sub-optimal fiscal policy in these countries, identifying three potential causes. The incomplete credit market of these developing countries favors their pro-cyclical fiscal policy. In the case of negative economic shocks, the emerging countries have at their disposal a limited array of credit instruments, contingent upon their ratings, as noticed in the case of Latin American countries, which during crisis

periods made much more frequent use of the IMF loans as compared to the regular periods (Gavin and Perotti, 1997). Latin America's fiscal policy's pro-cyclicality was also confirmed by Alberola *et al*. (2006), who stated that the region's financial vulnerability was not merely connected with the level of outstanding public debt but was also due to the financing conditions' volatility and to their impact upon the fiscal authorities' financing capability.

Riascos and Vegh (2003) developed a neoclassical fiscal policy model in which public expenditures offer direct utility to taxpayers. The government chooses in an optimal way both the level of taxation as well as the expenditures to be made. When we are talking about a complete and deep credit market, the fiscal policy will be a-cyclical, however the emergent countries benefit from merely an incomplete market, employing only a small group of credit instruments, mostly long-term bonds. A less complete credit market also impairs the government's ability to support a stable consumption pattern inside the respective country (Ilzetzki and Vegh, 2008).

Starting with Gini's social inequality coefficient, Woo (2009) claims that heterogeneity of the different social groups' preferences is a determinant of pro-cyclicality. His study, encompassing a large group of countries over the 1960-2003 period, evidenced a positive correlation between social inequality, pro-cyclicality and fiscal volatility. As determining factors for the two phenomena, Woo mentions the economic and educational inequalities of different social groups and proposes stronger fiscal regulations in view of stabilizing the developing countries' economic situation.

Alesina *et al*. (2008), Thorton (2008), Riascos and Vegh (2003), as well as Tornell and Lane (1999) connected the emergent countries' fiscal policy pro-cyclicality to the respective countries' political structures and institutions.

Tornell and Lane (1999) speak about the "voracity effect"; namely, the public resources' competition leads to disproportionate distribution of these resources, determining an increase in public expenditures during the economic boom period. Gavin and Perotti (1997) maintain that the voracity effect represents one of the main causes of pro-cyclicality in Latin America.

Alesina *et al*. (2008) employed an empirical econometric model that connected the fiscal policy to the agent problem. In their approach, the political group extracts rents from the public resources, whereas voters observe only the final results of public expenditures. During the economic boom period, voters press the politicians to either increase public spending or to lower taxes in order to maximize their publicly – or privately-generated revenues. Nevertheless, if in the short run increasing government spending contributes to economic growth, in the long run, their marginal cost exceeds the marginal benefits to the economy (Mountford and Uhlig, 2008).

Incipient democracy and a high level of corruption are positively correlated with pro-cyclicality. Countries with a volatile output and a dispersed political power are predisposed to having a pro-cyclical fiscal policy, with government salary consumption as the most important tool through which these variables influence fiscal cyclicality (Lane, 2003). Halland and Bleaney (2011) analyzed pro-cyclicality supporting theories for the emerging countries, by comparing developing and high-income countries and using a series of econometric estimations, thereby partially confirming the theory of Alesina *et al*. (2008).

Among the pro-cyclical approaches, we may notice also that, most of the times, the increase in expenditures as a method of redistributing income will be preferred to reducing taxation (Tanzi and Schuknecht, 1998).

On the other hand, Thorton (2008) obtained results which are totally different from the ones of Alesina *et al*. (2008) concerning corruption and fiscal pro-cyclicality. His study concerning 37 African countries revealed that, for those countries, higher corruption levels encouraged anti-cyclicality. Given the limited group of studied countries, from the same geographical areas, Thorton suggests as an explanation the fact that a high corruption level leads to lower fiscal revenues and, implicitly, to lower government expenditures.

Martorano (2017) highlighted the need for changes in the Latin American countries' fiscal policies and the way in which these countries were able to implement counter-cyclical policies to face the negative economic and social consequences of the recent crisis.

3. Materials and Methods

3.1. The Designed Model

There is a significant number of researches and theories concerning fiscal policy's pro-cyclicality for the developing countries, its motivations and the ways to calculate it. Halland and Bleaney (2011) considered regressions as the most efficient methods for measuring pro-cyclicality. The building of regressions requires identifying the dependent variable as an output of the fiscal policy, with ratio of government expenditures to GDP or fiscal balance as the most used ones.

The evolution of GDP under different expressions (first-order difference, logarithmic or as a growth rate) is also often used to measure the effects of fiscal policy as the processing may produce stationary series as compared to the use of variables per se.

While it would be useful for the research to observe tax revenues evolution to better asses a pro-cyclical character of states' fiscal policies, the tax-related variables are often inconsistent for longer period of times for a heterogeneous group of countries (as the one we selected, for instance). Moreover, depending on the type of analyzed country, tax revenues may be influenced by other important factors besides cyclicality, such as the tax evasion and the underground economy, the influence of election years, the governments' preference to tax income or consumption. Even if some of the factors are quantifiable, the reliability of information on the heterogeneous group of countries is questionable.

Further on, there is also a considerable range of control variables. Halland and Bleaney (2011), for example, used the credit restraint along the economic cycle, political instability, social inequality, the evolution of purchasing power and democracy and corruption levels as control variables.

In this respect, our model follows a similar approach to the one used by Halland and Bleaney (2011), testing the country sample for a cyclical pattern on fiscal policy's expenditure side, as well as analyzing the potential factors that might contribute to public expenditure's cyclical evolution – on this matter, we would test the aforementioned cyclicality theories with respect to incomplete financial market, social factors as well as political causes.

Our paper uses a sample composed of all the EU countries, except for Malta and Cyprus (which presented inconsistent data), for the 1995-2014 period. As our chosen sample is heterogeneous, with countries of different development economic levels and patterns of fiscal policy, we decided to divide them into two homogenous sub-samples (developed and developing countries), according to the level of GDP per capita. Subsequently, we have also analyzed the entire EU sample.

The developing countries' sample includes Bulgaria, the Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Greece, Poland, Romania and Slovakia. The developed

countries' sample includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

Starting from Halland and Bleaney's regression, we have built the following model:

$$\Delta \ln(Publ\_exp_t) = \alpha + \beta * \Delta \ln(GDP_t) + \gamma * \ln(Publ\_exp_{t-1}) + \delta * T_t + \varepsilon_t \quad (1)$$

where:

- $Publ\_exp_t$: *t* year's nominal value of public expenditures for each country;
- GDP_t: *t* year's nominal GDP value for each country;
- $Publ\_exp_{t-1}$: *t-1* year's nominal value of public expenditures from each country;
- T_t: time trend;
- ε_t: specific error.

The regression will be applied using time-series for each country. Subsequently, we used the following equation:

$$\hat{\beta} = a + b * Pol + c * Credit + d * Ineq + e * Controls + \mu \quad (2)$$

where:

- $\hat{\beta}$: estimated value of β coefficient from equation (1) for each country;
- Pol: a vector accounting for elements of countries' political structure. Under the given situation, this variable will be built from POLITY2 measure, using corruption and political stability indexes for each country;
- $Credit$: refers to credit constraints for each country. Under the given situation, we will follow the evolution of public debt and the corruption index as it can influence the public credit area;
- $Ineq$: measures social inequality for each country. Under the given situation, it will be represented by the Gini inequality coefficient;
- $Controls$: control variables. In equation (2) we use PPP (purchasing power parity).
- μ: specific error.

In order to compare our estimation results with the ones previously obtained by Halland and Bleaney (2011) of testing the aforementioned cyclicality theories, part of the cross-sectional model's variables would follow the initial variables used in this respect, such as the Pol vector constructed using a similar variable, the $Ineq$ variable represented by the Gini coefficient, as well as one of the control variables chosen (*i.e.* the purchasing power parity).As a distinct feature, the $Credit$ measure follows public debt's evolution as percentage to GDP, because the information regarding the selected EU countries' external debt were not consistent during analyzed period. While the variable does not offer important information regarding the cyclical evolution of access to external credit, we may observe if economic cycle's stage may be associated with public debt's fluctuation, as a possibility of satisfying public spending needs.

For equation (2) we use average values for each variable, calculated for the entire analyzed period and each country.

3.2. Data Description and Analysis

To generate an overall image about the chosen variables trend, we present a statistic summary in Table 1.

Table 1

Statistics Summary for the Entire Sample

Variable	Observations	Average value	Standard deviation	Minimum value	Maximum value
Public_exp	520	1.07E+11	1.65E+11	1.05E+09	7.48E+11
GDP	520	5.24E+11	8.12E+11	4.37E+09	3.87E+12
Polity2	520	9.442308	1.537125	-5	10
Corruption	520	1.0335	0.898343	-0.82	2.59
Political_stab	520	0.8078846	0.4419328	-0.48	2.03
Gini	509	29.43713	4.121303	20	39.4
pb_debt	517	52.91044	32.14766	3.7	180.1
PPP	520	6.334578	22.06245	0.018861	131.3376

Source: Data processed by the authors.

From Table 1 we observe that public expenditures and GDP standard deviations are quite big, as a result of sampled countries' heterogeneity. We may notice that for most variables in the selected countries we cannot established a trend. For instance, public debt displays a standard deviation of 32.12766; however, the value is expressed as a percentage, since is given as ratio to country's GDP.

Further on, in Table 2 we present the correlation matrix for the variables used in the models, for the EU's developed countries' group.

Table 2

Correlation Matrix for Developed Countries Sample's Variables

	Public_exp	GDP	Polity2	Corruption	Pol_stab	Gini	pb_debt	PPP
Public_exp	1							
GDP	0.99	1						
Polity2	-0.227	-0.165	1					
Corruption	-0.297	-0.315	0.150	1				
Pol_stab	-0.533	-0.53	0.191	0.576	1			
Gini	0.215	0.248	0.088	-0.65	-0.506	1		
pb_debt	0.259	0.258	-0.221	-0.633	-0.323	0.234	1	
PPP	-0.229	-0.259	0.127	0.457	0.254	-0.512	-0.214	1

Source: Data processed by the authors.

Table 2 reveals the correlations between the variables used for both equations, showing the type of influence they have upon the dependent variable, as well as upon other model variables. One may notice a close positive correlation between GDP's evolution and the evolution of developed countries' public expenditures.

Among the explanatory variables, public expenditure is positively correlated with the Gini coefficient and public debt, indicating that an increase in social equality and public debt may further determine an increase in the developed countries' public expenditures.

Particularly, we notice that measures referring to government's policy are inversely influencing both public expenditures and the GDP. As such, the statistical analysis suggests

that in the developed countries a stable policy may cause a reduction in both public expenditures and the GDP.

Most variables are strongly correlated between them, except for *Gini* and *Polity2* measures, whose correlation is only 0.0883. We may notice (as expected) a strong connection between corruption index, political stability, and inequality, as these factors are often highly connected. It is as well noticed that poor political structures, corruption and instability seems to produce an increase in and, especially, of public debt measure, which in this situation is inversely correlated with corruption.

Table 3 presents the variables correlation matrix for the models selected to analyze the EU developing countries' fiscal policy stability.

Table 3

Correlation Matrix for Developing Countries Sample Variables

	Public_exp	*GDP*	*Polity2*	*Corruption*	*Pol_stab*	*Gini*	*pb_debt*	*PPP*
Public_exp	1							
GDP	0.994	1						
Polity2	0.257	0.252	1					
Corruption	0.036	0.027	0.415	1				
Pol_stab	0.001	-0.002	0.337	0.654	1			
Gini	0.047	0.067	-0.029	-0.207	-0.412	1		
pb_debt	0.510	0.464	0.239	-0.026	-0.139	-0.03	1	
PPP	0.074	0.04	0.163	0.147	0.225	-0.254	0.234	1

Source: Data processed by the authors.

The correlation matrix for the developing countries sample's variables differs from several perspectives from the one used for the developed countries. At a general level, we may find much looser connections between the dependent and explanatory variables, and between each explanatory variable and the other explanatory variables, respectively.

Similar to Table 2, the GDP size also significantly influences the level of government expenditures and certain correlations hold, as the one between the political stability measure and corruption. We may also identify a direct relationship between the evolutions of public debt, public expenditures and GDP. As opposed to the previous situation, where *Polity2* was negatively correlated with public expenditures and GDP, in the case of the developing countries it exerts a direct influence upon the two above-mentioned macroeconomic measures, suggesting that a better political structure may help increasing both public expenditures and the GDP.

Finally, we verify whether the dependent variable's data are stationary to successfully check information's reliability. As we are working with an increased number of countries (26 of the 28 European Union Member States), we perform stationary tests on the whole panel data.

We selected three stationarity tests used for panel data, as follows:

- Fisher-type test (based on augmented Dickey-Fuller tests) – applicable for both balanced and unbalanced panels;
- Im-Pesaran-Shin test – applicable for both balanced and unbalanced panels;
- Lagrange multiplier stationarity test – applicable solely for strongly balanced panels.

The null hypothesis of both Fisher-type and Im-Pesaran-Shin tests state that all the panels contain unit roots, while the alternative hypothesis suggest that at least one panel is stationary (Fisher-type) or some panels are stationary (Im-Pesaran-Shin). On the contrary,

the Lagrange multiplier suggests as a null hypothesis that all panels are stationary, while the alternative hypothesis would indicate that some panels have unit roots.

As usually the dependent variable ($\Delta \ln(Publ\_exp_t)$) exhibits a trend, we account for the trend when analyzing stationarity. Moreover, to mitigate the cross-sectional dependence risk, we subtract the cross-sectional average prior to verifying for unit root.

Further on, the p-value of Fisher-type test appears to be 0 both when no lag or when a lag is added, thus rejecting the null hypothesis. The results are consistent with the Im-Pesaran-Shin test as well.

When applying the Lagrange multiplier test, the null hypothesis is confirmed in the case of the whole panel solely if we do not check for heteroskedasticity. If we verify for heteroskedasticity, the panels remain stationary only for the developed countries, while some panels from the developing country group contain unit roots.

4. Empirical Results and Discussions

The econometric model (1) is run for time-series for the 1996-2014 period (because of the first order differences, we lose 1995). The type of estimation used is specific to the ARIMA models which have null autoregressive, integration, and mobile averages orders, respectively. The estimation is done for each country, following the value of β coefficient. The results are presented in Table 4.

Table 4

ARIMA Country-by-country Regression Results for the EU Member Countries Time Series

Country	α	β	γ
Austria	-0.3761	0.9616***	0.0153
Belgium	-0.1954	0.9987***	0.0081
Bulgaria	0.7518	1.2546***	-0.0348
Czech	0.2697	0.8878***	-0.0110
Croatia	-1.3293	1.0123***	0.0578*
Denmark	-0.0976	0.9295***	0.0042
Estonia	-1.064*	0.9079***	0.0492*
Finland	-0.6946	0.9319*	0.0288
France	-0.3834	0.9718***	0.0144
Germany	-0.6769	0.9154***	0.0252
Greece	0.064	1.0073***	-0.0024
Ireland	-0.5838	1.0377***	0.0242
Italy	0.369	0.952***	-0.0137
Latvia	-0.4662	1.1161***	0.0203
Lithuania	-0.0221	0.8338***	0.0009
Luxembourg	-0.1283	0.7837***	0.0036
Holland	-0.3157	1.0077***	0.0126
Poland	-0.144	0.9789***	0.0058
Portugal	0.8971	1.015***	-0.0369
Romania	0.7708	0.8063***	-0.0323
Slovakia	0.0219	0.8483***	-0.0007

Country	α	β	γ
Slovenia	0.0313	0.8458***	-0.0009
Spain	-0.6388	1.0947***	0.0247
Sweden	-0.3047	0.9162***	0.0123
United Kingdom	0.3524	0.8201***	-0.0127
Hungary	0.0334	1.0203***	-0.0017

Note: For significance thresholds α=90%, α=95% and α=99%.Data source:
Source: Data processed by the authors.

Table 4 reveals constant results for all time-series regressions run for all the sample countries. The constant and the variable measuring precedent year's government expenditures are not significant; however, the variable measuring the GDP evolution influences public expenditures' evolution. The result is important as we further measure fiscal policy's pro-cyclicality via the GDP evolution. For all the analyzed countries, the β coefficient is positive, suggesting a direct link between the evolutions of GDP and public expenditures; therefore, a general pro-cyclical behavior displayed by the EU countries.

For Croatia and Estonia, the variables concerning public expenditures evolution and the constant are significant; however, at a discretionary level.

The variable of precedent year's government expenditures is not significant, suggesting that previous year expenditures do not influence expenditures' evolution; however, this can be due to differences in measures reporting. If the explanatory variable is presented as a first order difference between current and precedent years' government expenditures, previously logarithmized, the variable of precedent year's government expenditures is only logarithmized and not presented as a difference.

Employing data supplied by the first equation, the β estimated value is subsequently used as explanatory variable for equation (2).

Equation (2) appears under two expressions:

$$\hat{\beta} = a + b * POLITY2 + c * Corruption_{ind} + d * Pol_{stab} + e * Gini + f * Publ_{debt} + g * PPP + \mu \quad (2.1)$$

where:

- $\hat{\beta}$: estimated value of β from equation (1);
- $POLITY2$: the values of the POLITY2 measure;
- $Corruption_{ind}$: corruption index;
- Pol_{stab}: political stability index;
- $Gini$: social inequality expressed by the Gini index;
- $Publ_{debt}$: public debt as a percentage of that year's GDP;
- PPP: purchasing power parity.

$$\hat{\beta} = a + b * Political_{measures} + c * Gini + d * Publ_{debt} + e * PPP + \mu \quad (2.2)$$

In equation (2.2), $Political_{measures}$ represents a vector cumulating all the measures concerning previously illustrated country policy. In equation (2.1) they have separate coefficients, whereas in (2.2) they are cumulated and display a unique coefficient.

For the 1995-2014 period, we calculate the average for each variable, getting an equation for each registered β. The regression will be cross-sectional, initially separated for each of the two groups of countries and subsequently for the two reunited subsamples. For the two groups of countries the regressions do not show significant results, whereas for the two reunited groups we get two types of results, as follows:

- When we use the ensemble of variables specific for quantifying the policy effect on the cyclicality of fiscal policy, we can notice that *POLITY2* variable is the only one significant for the used group of variables (*P>|t| = 0.03*).

- The $Political_{measures}$ variable still continues to be significant, at an even higher level as previously (*P>|t| = 0.028*). The remaining variables are still not significant, however the significance threshold for Gini coefficient increases over the second model.

Table 5

Results of Cross-sectional Linear Regression for the Entire Sample of the EU Member States

Measure	Coefficient	Standard Error	t	P>|t|
$\mathbf{Political_{measures}}$	0.0510	0.2155	2.37	0.028**
Gini	0.0198	0.0113	1.75	0.094*
$\mathbf{Publ_{debt}}$	0.0005	0.0013	0.40	0.696
PPP	0.0012	0.0017	0.67	0.509

Note: For significance thresholds α=90%, α=95% and α=99%.
Source: Data processed by the authors.

The results are consistent with Alesina *et al.* (2008) agent theory. For the European Union countries, we notice that variables expressing political aspects are significant for a level *α=95%*, suggesting that political measures may influence the pro-cyclicality of public expenses.

For a *α=90%* level, the Gini coefficient becomes significant for the entire sample, suggesting that fiscal cyclicality may also be influenced by individuals' social inequality, partially confirming Woo's (2009) theory with respect to the selected group of EU countries.

However, as previously mentioned, when testing the theories on the two established samples (developing and developed countries), none of the variables is significant. The main reason for this result might be the reduced number of observations. When cross-sectional regression involves a single equation for each country with average values for each variable, group we get 14 equations for the developed countries, namely 14 observations, whereas only 12 for the developing countries group. Under these circumstances, it is natural for the obtained results to be less consistent.

Processing panel data

To further verify the results obtained in a more extensive environment, we use panel econometric estimations, as the number of observations increases in this context by giving up the averages used in the cross-sectional estimations. For this purpose, we use equations

(1), (2.1) and (2.2.) to build the econometric model employed for the data panel. The equations will be transformed as follows:

$$\ln(Publ\_exp_{i,t}) = \beta_1 + \beta_2 * \ln(GDP_{i,t}) + \beta_3 * \ln(Publ\_exp_{i,t-1}) + \beta_4 * Political_{measures_{i,t}} + +\beta_5 * Gini_{i,t} + \beta_6 * Public_{debt_{i,t}} + \beta_7 * PPP_{i,t} + \varepsilon_{i,t} \quad (3.1)$$

The equation is exposed linear, whereas for the explanatory variable and GDP we do not calculate first order differences and use only their logarithm values, to make them consistent with precedent year's government expenditures and the other values.

$Political_{measures_{i,t}}$ will incorporate, as previously, the values of *POLITY2*, of corruption and political stability indexes into a single measure of political activity for each country.

We test first the two separate samples of countries (developed and developing) and subsequently the entire sample of countries.

Empirical Results for the Developed Countries' Sample

As a first step in analyzing the developed countries' sample, we proceed in performing standard fixed effects and random effects regressions for panel data including developed countries' variables for the 1995-2014 period. Part of the results are presented in Table 6.

Table 6

Comparative Results for the Three Regressions Types for the Developed EU Countries Sample

Measures	Coefficients FE regression	Coefficients RE regression	Coefficients DK regression
$\ln(GDP_{i,t})$	0.7785***	0.0542***	0.5124***
$\ln(Publ\_exp_{i,t-1})$	0.3096***	0.5196***	0.5434***
$Political_{measures_{i,t}}$	-0.0252***	-0.0167***	-0.0093**
$Gini_{i,t}$	0.0029*	-0.004***	0.0011
$Public_{debt_{i,t}}$	-0.0003*	-0.0005**	-0.0065*
$PPP_{i,t}$	0.0407**	0.0159***	0.0266

Note:For significance thresholds α=90%, α=95% and α=99%.
Source: Data processed by the authors.

As a first remark, we see that part of the previously obtained results are confirmed by this new approach, with cyclicality appearing to be highly influenced by the country's political structure. In addition, the other analyzed potential factors seem to impact cyclicality as well, with the random effects' regression suggesting a major impact for both the Gini coefficient for α=99% and the public debt for α=95%, while fixed effects' model predicts only a discretionary influence of the two aforementioned factors over public expenditures.

The effect the coefficients have on the public expenditures' evolution seems to be pro-cyclical, as the variables' increased values describe countries with a more stable political structure and decreased public expenditures' values, since for all the three regression types the values obtained for the political measures were negative.

Surprisingly, public debt appears to be associated with a more reduced cyclical behavior, however the results obtained are very weak. Gini coefficient generated mixed results, causing an increase in cyclicality in case of fixed effects regression, respectively a decrease when using random effects approach.

Running a Hausman test to verify which of the two approaches is efficient when modeling public expenditures' cyclicality, we obtain *Prob>chi2 = 0.000*, suggesting that the fixed effects models are more appropriate. Further on, we use a Driscoll-Kraay regression, (which computes robust standard errors - the results are presented as well in Table 6), to test the cross-sectional dependence and heteroskedasticity.

When analyzing the results obtained for all the regressions, we notice a permanent significant influence of the variable which aggregates the measures quantifying the political effect. Moreover, the results are similar, suggesting that strong political structures may be associated with reduced cyclicality.

Also, one may notice that for certain regressions the Gini coefficient influences the dependent variable. Nevertheless, for the Driscoll-Kraay regression, which is used especially for the data panel which presents heteroskedasticity and cross-sectional dependence phenomena (as the case), the variable is not significant for any of the significance thresholds used.

Finally, the debt as a ratio-to-GDP is relevant in both the fixed effects and the Driscoll-Kraay regression, for a marginal level of *α=90%.*

Considering the divergent results obtained from running the regressions we can still claim that the political system and credit are two factors which appear to influence the developed countries' cyclicality of fiscal policy.

To observe the effect of the evolution of precedent years' explanatory variables upon the current year's dependent variable, we use an Arellano-Bond regression with a one-year lag. The lag is significant within the regression with a probability of *P>|z|=0.000*. The GDP and political situation are the model's significant variables, both for the α=99% threshold, with the rest of the variables not significant for any of the significance thresholds used.

Empirical Results for the Developing Countries' Sample

For the developing countries panel, we use a random effects regression, as suggested by the Hausman test, with results presented in Table 7.

Table 7

Random Effects Regression for the EU Developing Countries' Sample

Measure	Coefficients	Standard Error	Z	P>|z|
$\ln(GDP_{i,t})$	1.0183	0.0502	20.28	0.000***
$\ln(Publ\_exp_{i,t-1})$	-0.0118	0.0498	-0.24	0.813
$Political_{measures_{i,t}}$	0.0134	0.0037	3.62	0.000***
$Gini_{i,t}$	0.004	0.0025	1.55	0.120
$Public_{debt_{i,t}}$	-0.0023	0.0004	-0.61	0.543
$PPP_{i,t}$	-0.0009	0.0006	-1.42	0.154

Note:For significance thresholds α=90%, α=95% and α=99%.
Data source: Data processed by the authors.

Even in this case we may notice a strong correlation between the variable measuring political effects and the dependent variable. Except for that, solely the GDP variable is still significant for the random effects model, while the Gini coefficient is non-significant at a discretionary level.

This result supports the previous findings of the cross-sectional regression regarding the connection between the political measures and fiscal policy's cyclicality. However, if within the cross-sectional regression previously used, the result appears only for the entire sample, for this panel it is consistent for each sub-sample. We further apply a one-year lag Arellano-Bond regression to follow the effect certain variables have across the entire period, with results presented in Table 8.

One may notice that the lag is statistically significant, yet the results are fairly different as compared to previous regressions. Precedent year's variables, which influence current year's government expenditures are the GDP, the Gini coefficient and the purchasing power parity.

Considering developing countries' characteristics, which favor a pro-cyclical fiscal policy, it is likely that social inequality would determine populist approaches in fiscal policy and, implicitly, influence the modification of subsequent year's government expenditures. Precedent year's government expenditures are excluded, as a result of collinearity effects.

Table 8

The Results of Arellano-Bond Regression for the EU Developing Countries' Sample

Measure	Coefficients	Standard Error	Z	P>|z|
Lag1	0.2233	0.0241	9.28	0.000***
$\ln(GDP_{i,t})$	0.7507	0.0246	30.47	0.000***
$Political_{measures_{i,t}}$	0.0009	0.0035	0.25	0.806
$Gini_{i,t}$	-0.0069	0.0017	-3.93	0.000***
$Public_{debt_{i,t}}$	-0.0000	0.0002	-0.12	0.908
$PPP_{i,t}$	0.0062	0.0022	3.02	0.003***

For significance thresholds α=90%, α=95% and α=99%

Source: Data processed by the authors.

Empirical Results for all the EU Analyzed Countries

We have further decided to study fiscal cyclicality effects across all the EU analyzed countries. To study the time evolution of fiscal cyclicality, we use a fixed effects model, as suggested by the Hausman test. After running the regression, we got similar results to the ones obtained for the two subsamples separately analyzed. The variables of GDP and of precedent year's government expenditures appear as significant for this model for all the significance thresholds used.

Also, the variable measuring the political effect is significant for all the thresholds, whereas public debt is relevant only for the α=95% threshold. Social inequality and purchasing power parity seem to have no relevant influence whatsoever in this model.

The influence of political measures, corruption, and of political stability, respectively, are all factors which appear to influence the decisions orienting the fiscal policy. For the developing countries, these results strengthen the conviction that the populist political measures usually applied in these countries contribute to the exacerbation of economic cyclicality.

Considering that public debt accumulates, without catching the effect the external and the internal public debt have on cyclicality, it is difficult to estimate the real influence which the access to loans in an international market has upon policy orientation towards *pro-* or *anti-*cyclicality. The results obtained for the three types of regressions are presented in Table 9.

Table 9

Estimators' Comparison for the Three Types of Regressions Run for All Analyzed EU Countries

Measure Estimators	FE regression	RE regression	DK regression
$\ln(GDP_{i,t})$	0.6754***	0.4106***	0.3854***
$\ln(Publ\_exp_{i,t-1})$	0.3446***	0.5984***	0.5368***
$Political_{measures_{i,t}}$	-0.0133***	-0.0026	-0.0076***
$Gini_{i,t}$	-0.0019	-0.0037***	-0.0032*
$Public_{debt_{i,t}}$	-0.0004**	-0.0004**	-0.0005**
$PPP_{i,t}$	-0.0002	0.0003	-0.0002

Note: For significance thresholds α=90%, α=95% and α=99%.
Source: Data processed by the authors.

Fixed effects' regression and the one with heteroskedasticity's correction option produce similar results, whereas the Driscoll-Kraay regression also has the Gini coefficient as a significant variable and confirms the other results.

Considering this regression is specific for the fixed effects' data panel, which presents the heteroskedasticity and cross-sectional dependence phenomena, and the fact that it validates previous regressions' results, we may conclude this regression's results will be taken as reference to discuss the influence of the mentioned factors upon government expenditures and, implicitly, upon fiscal policy's cyclicality.

Table 10

Arellano-Bond Regression with One, and Two Lags, Respectively, for the Analyzed EU Countries

Measures	Arellano-Bond regression with one lag	Arellano-Bond regression with two lags
Lag 1	0.2218***	0.3214***
Lag2	-	-0.0897***
$\ln(GDP_{i,t})$	0.7646***	0.746***
$Political_{measures_{i,t}}$	-0.0122***	-0.0153***
$Gini_{i,t}$	-0.003**	-0.0024*
$Public_{debt_{i,t}}$	-3.53e-06	0.0051**
$PPP_{i,t}$	0.0041**	0.0051**

Note: For significance thresholds α=90%, α=95% and α=99%.
Source: Data processed by the authors.

Rerunning the regression only with significant variables (thereby excluding purchasing power parity) does not induce changes of the significant variables, but merely modifications of the $P>|t|$, without changing the thresholds for which the used variables are significant. Similar to previous panels study, we run an Arellano-Bond model. For the panel which includes the entire analyzed sample, we follow the effect the previous variables have upon current government expenditures, for both one and two lags cases.

One may notice that both lags are significant for this model. The variable expressing politics is also significant in this case, for both types of models, as well as the Gini coefficient, whose relevance decreases for the second regression.

Considering the ambiguous results of public debt for measuring cyclicality we may state that choosing this measure is not necessarily the best solution, since it does not reflect the access different countries have to international credit.

System GMM Estimates - Robustness Check

In order to check our previous results' robustness, we run a dynamic panel data regression using the robust version of system GMM estimation procedure (Arellano and Bover, 1995), accounting for EU's advanced, and developing countries, respectively. The results are presented for each of the two subsamples separately. The GMM estimators have the advantage of using a larger subset of instruments, not only for the lagged dependent variable, but also for other explanatory variables, which might themselves show evidence of high inertia (Arellano and Bover, 1995; Blundell and Bond, 1998) and stationary effect (Hayakawa, 2007). The 0.00 Wald test *p-value* in all specifications suggests rejection of the null hypothesis that the independent variables are jointly zero[5]. However, the GMM estimation technique's drawback is over-fitting the endogenous variables, increasing the number of instruments and thus leading to biased and inconsistent estimates (Roodman, 2009)[6]. Another GMM system's disadvantage is causing a fast growth of instruments count with time dimension, resulting in an over-fit of endogenous variables and failing to remove the endogenous component (Roodman, 2009). We also use internal instruments for the lagged dependent variable and GDP to exploit one of method's main strengths and avoid the difficulty of finding valid external instruments, as in Table 11 below.

Table 11

Arellano-Bond Regression with One and Two Lags, Respectively, on the Analyzed EU Countries

	(System GMM)	(System GMM)	System GMM
Dependent variable $\ln(Publ\_exp_{i,t})$	Advanced EU countries (1)	Developing EU countries (2)	Whole sample (3)
$ln(Publ\_exp_{i,t-1})$	0.632**	0.408***	
$ln(Publ\_exp_{i,t-1})$ x *DV_ a*			0.791***
$ln(Publ\_exp_{i,t-1})$ x DV_d.			1.008***
$ln(GDP_{i,t})$	0.259	0.660***	
$Political_{measures_{i,t}}$	-0.302	-0.0454	-0.281
$Gini_{i,t}$	-0.00561	0.00154	-0.00229

[5] System GMM is more persistent than difference GMM, particularly with a higher persistence of the dependent variable and a lower time dimension (Blundell and Bond, 1998), The improvement in efficiency is enhanced by the ability of system GMM to use more information by generating more instruments not only for the lagged dependent variable, but for other regressors as well, which might themselves exhibit high inertia.

[6] The "system GMM" estimation technique is more suitable for the panel data models with large number of individuals and few numbers of time periods (small T, large N panels), with explanatory variables that are not strictly exogenous (Roodman, 2009).

	(System GMM)	(System GMM)	System GMM
$Public_{debt_{i,t}}$	0.000652	-0.00166*	0.000597
$PPP_{i,t}$	0.00272	0.000543	0.000296
Constant	2.834	-2.557	
DV_ a			5.665**
DV_d			0.0395
Observations	259	225	483
Number of countries	14	12	26
Arellano-Bond test for AR(1)	0.284	0.088	0.007
Arellano-Bond test for AR(2)	0.552	0.756	0.021
Number of instruments	12	12	14
F statistics, p value	0.000	0.000	0.000
Sargan test, p value	0.083	0.000	0.000
Hansen test, p-value	0.611	0.159	0.327

Note: For significance thresholds α=90%, α=95% and α=99%.
Source: Data processed by the authors.
Note: Internal instruments are used for endogenous variables (lagged dependent variable and GDP). Lag limits are used for the lagged dependent and endogenous variables. The collapse option is always used. DV_a and DV_d denote country dummy variables for advanced, respectively developing EU countries. Column (3): There is no base group and the constant is removed.

The presence of endogenous component can potentially weaken the Sargan/Hansen statistics of over-identifying restrictions (Bowsher, 2002). To overcome the GMM system's drawbacks, we use internal instruments for lagged dependent variable and GDP, to avoid the difficulty of finding valid external instruments. To deal with high number of instruments, following Roodman (2009), we consider a lag limit for dependent variable and other endogenous regressors, thereby collapsing the number of instruments. We use institutional-related variables of *political measure, GINI, public debt* and *PPP* as instrumental variables for endogenous variables, to overcome the endogeneity problem.

Particularly, we use system GMM estimates and report robust two-step GMM estimates with standard errors robust to heteroskedasticity and serial correlation (Roodman, 2009). We address the downward bias of standard errors in two-step GMM using the proposed correction term by Windmeijer (2005), implemented by the *xtabond2* Stata command. Moreover, based on Hansen test of over-identifying restrictions and Hansen's test of GMM instruments' exogeneity, the diagnostic tests are providing evidence of validity for instruments and instruments for endogenous components.

Focusing on the EU developing countries sample, we found that GDP and previous year's government expenditures variables appear as significant, whereas social inequality, political measure and purchasing power parity seem to have no influence on the decisions orienting fiscal policy. On the other hand, for the advanced EU countries, we found that only previous year's government expenditures variable was significant, confirming that government expenditures are subject to persistence effects in these countries. According to the results presented in both columns of Table 11, an increase by 1 per cent in government expenditures' agglomeration effect results in current government expenditures' increases by 0.6, and 0.4 per cent, respectively, for EU's advanced and developing countries, respectively, in a *ceteris paribus* assumption. The results confirm there is no indication that policy makers are concerned with debt movements, since public debt's coefficient is significant only at 10 per cent and only for the EU developing countries with its impact very

small for this group of countries. This indicates that a considerable increase in public debt, by 10 percent, worseness government expenditures' ratio by only 0.01 percent. This deficiency of considering debt movements relays well to recent European events, when global economic and financial turmoil's concerns were aggravated by high debt levels of several EU countries and the ensuing uncertainty over debt sustainability (Kabashi, 2014).

Column 3 shows differences in discretionary policy's cyclicality across the country groups, which is one of our study's main issues of interest. In column 3 we find that the autoregressive coefficient is significant for both groups of countries at all three thresholds, confirming the persistence of cyclical discretionary policies for both EU advanced and developing countries. Discretionary policy was found cyclical in the EU developing countries and pro-cyclical in the EU advanced countries. This result can be attributed to the fact that countries with a bad experience of economic and financial turmoil are more likely to be exposed to cyclical economic movements. Indeed, these results indicate that the EU advanced countries display pro-cyclicality throughout the entire sample.

5. Conclusions

Our study brings a new perspective upon pro-cyclicality and anti-cyclicality of fiscal policy's public expenditures side and its determinants for the EU member countries, with the view of establishing a model which could support fiscal policy's sustainability. Starting from the Halland and Bleaney (2011) model we analyzed the way in which government expenditures' evolution responds to economic, social and political stimuli.

As such, if we start with an a-priori premise that the developed countries lead an anti-cyclical policy, whereas the developing countries a pro-cyclical one, the analysis of fiscal policy instruments adopted during the analyzed period shows that this was not necessarily valid in all the cases. We found that in the analyzed period most countries appear to have led a pro-cyclical policy, no matter if they were developed or pertaining to the Eastern group of EU member countries.

Our study focused as well on identifying factors that may contribute to a pro-cyclical behavior of public expenditures side, testing theories related to social inequality (Woo, 2009), countries' political structure (Alesina *et al*., 2008) and incomplete credit market (Gavin and Perotti, 1997). The results suggest that political factors and social inequality are associated with pro-cyclical government expenditures for the entire group of the EU analyzed countries, in both the cross-country and panel regressions.

In our analysis, we noticed that inequality appears as the most important for the developing countries, and it is significant for the entire sample of analyzed countries, including the developed ones. For all the regressions, no matter the method or sample considered, politics appear as a factor which strongly impacts government expenditures.

The influence political norms have upon fiscal policy's cyclicality is consistent across the entire study, resonating with the results of Alesina *et al.* (2008), stating that in countries with non-consolidated democracies, where corruption is active, pro-cyclicality is even more present. Such results are consistent during the study for both groups of developed and developing countries, offering a significant insight about the importance of designing good political institutions, as well as for decreasing corruption when aiming to conduct a sustainable fiscal policy.

When analyzing the influence the public debt exerts upon government expenditures, we can see some significant results for selected EU countries; however, since debt is not decomposed into its external and internal components, the information does not provide a

strong reason to associate the pro-cyclicality with an incomplete credit market in the EU - where countries would often resort to accessing more expensive external debt during recessions, worsening locally the economic context. To properly test the application of an incomplete credit market theory at the level of Member States and to expand the existent study, a useful future direction would include such a decomposition, as well as the addition of cyclicality's revenue-side analysis.

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