

# THE CYCLICALITY AND DEVELOPMENT OF GOVERNMENT EXPENDITURE IN THE VISEGRAD GROUP

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**Abstract:** *The aim of the article is to provide direct empirical evidence on government expenditure in the Visegrad Group. Government expenditure plays important role in a fiscal policy of each country as a possible automatic stabilizer. Previously published studies are weakly supported by the data particularly in emerging and post-transition economies that's why the analysis is focused on Visegrad countries. The article concentrates on development of total government expenditure, changes in the structure, and also on the cyclicality of government expenditure. We used annual data on government expenditure in compliance with the COFOG international standard during the period 1995 – 2009. GDP time series were cyclically adjusted. The results suggest that government expenditure and their allocation are similar in Visegrad Group despite the existing differences in the size of the public sector. On the other hand the cyclicality of government expenditure differs across the countries. Government expenditure is countercyclical only in the Slovak Republic, it is procyclical in other countries of the Visegrad Group.*

**Keywords:** *Government expenditure, COFOG classification, Cyclicality, Correlation.*

**JEL Classification:** *C32, H50, E62.*

## Introduction

Current governments often solve a problem how to support economic growth and consolidate public finance. Government expenditure and factors of their growth are a serious problem of many countries. The aim of the article is to analyze development of total government expenditure, changes in the structure and also the cyclicality of government expenditure in the Visegrad Group. Government expenditure plays important role in a fiscal policy of each country as a possible automatic stabilizer. Although the theory implies that government expenditure is countercyclical, recent evidence suggests that it is procyclical. However, previously published studies are weakly supported by the data particularly in emerging and post-transition economies in which results can vary. That's why the analysis is focused on the Visegrad Group.

The Visegrad Group, also called the Visegrad Four or V4, is an alliance of four Central European states – the Czech Republic, Hungary, Poland and Slovakia – for the purposes of cooperation and furthering their European integration. All of the Visegrad countries have relatively developed free market economies and have enjoyed more or less steady economic growth since the revolutions of 1989. In 2009, Slovakia adopted the euro as official currency. The Visegrad Group is the seventh largest economy in Europe and the 13th in the world. Despite the similar history, individual countries of the Visegrad Group have differently structured and oriented economies and social preferences, which are also reflected in the distribution of public expenditure.

We used annual data on GDP and government expenditure in millions of national currency in compliance with the COFOG international standard during the period 1995-2009 from Eurostat. GDP time series were cyclically adjusted. Total government expenditure time series were also cyclically adjusted for correlation and assessment of the cyclicity. Hodrick-Prescott filter is used for isolating the cycle component of time series. Results are mostly calculated in econometric program Eviews 7.

## **1 Statement of a problem**

The economy of the country is greatly influenced by the level and the structure of government expenditure. It is one of the major processes by which the welfare of the people is ensured and it is an important part of government's budget.

The government expenditure is an important tool for national governments to mitigate the uneven economic development and economic shocks across individual countries. From a Keynesian perspective, there is a view that government expenditure should act as a stabilizing force and move in a countercyclical direction. Pro-cyclical fiscal policy is conversely policy expansionary in booms and contractionary in recessions. It is necessary to point that pro-cyclical fiscal policy is generally regarded as potentially damaging for welfare: it can raise macroeconomic volatility, depress investment in real and human capital, hamper growth, and harm the poor [11]. If expansionary fiscal policies in "good times" are not fully offset in "bad times", they may also produce a large deficit bias and lead to debt unsustainability and eventual default. If a government respects a basic prescription that fiscal tools should function counter-cyclical, the optimal fiscal policy involves a decreasing of government expenditure in "good times" and an increasing of government expenditure in "bad times." Contrary to the theory, a number of recent studies found evidence that government expenditure is pro-cyclical [2], [4], [7], [10], [13]. Analysis of [12] shows that fiscal pro-cyclicity is evident in a much wider sample of countries. Lane [8] finds pro-cyclicity in a single-country time series study of Irish fiscal policy. For G7 countries, the correlation between government consumption and output indeed appears to show no pattern and be clustered around zero [3]. Also [9] shows that the level of cyclicity varies across spending categories and across OECD countries. We followed study of [1], they tested differences in the cyclicity of government spending across functional categories. Their evidence from 20 OECD countries suggests that pro-cyclicity is more likely in smaller functional budgets, but capital spending is more likely to be pro-cyclical for the larger spending categories. Many of researches have focused on Latin America, see [5], [6] for details. We would like to eliminate the literature gap in this field and analyze government expenditure in the Visegrad Group.

## **2 Methods**

The dataset consists of annual data on GDP and government expenditure in compliance with the COFOG international standard during the period 1995 – 2009. Although data from 2009 are available we prefer to work in the part of cyclicity testing with a consistent dataset that excludes observations from a crisis period. When we used data from 2009, time series were non-stationary (even Unit root test of 2<sup>nd</sup> difference). All the data were collected from the Eurostat database. The series for GDP

and total government expenditure and its subcomponent are adjusted at constant prices. We converted all series into logs and applied the Hodrick-Prescott filter with smoothing parameter 100 to each series with the aim to isolate the cycle component of time series. We apply cross-correlation to all combinations of GDP – category of government expenditure. Johansen cointegration test and the error correction model (ECM) are used to estimate the long-run relationship between output and government spending predicted by, for example, Wagner’s Law. Most of the results are calculated in econometric program Eviews 7.

Many studies point out that using non-stationary macroeconomic variable in time series analysis causes superiority problems in regression. Thus, a unit root test should precede any empirical study employing such variables. We decided to make the decision on the existence of a unit root through Augmented Dickey–Fuller test (ADF test). The equation (1) is formulated for the stationary testing.

$$\Delta x_t = \delta + \delta_1 t + \delta_2 x_{t-1} + \sum_{i=1}^p \alpha_i \Delta x_{t-i} + u_t \quad (1)$$

ADF test is used to determine a unit root  $x_t$  at all variables in the time  $t$ . Variable  $\Delta x_{t-i}$  expresses the lagged first difference and  $u_t$  estimate autocorrelation error. Coefficients  $\delta_0$ ,  $\delta_1$ ,  $\delta_2$  and  $\alpha_i$  are estimated. Zero and the alternative hypothesis for the existence of a unit root in the  $x_t$  variable are specified in (2). The result of ADF test, which confirms the stationary of all time series on the first difference, is available on request.

$$H_0: \delta_2 = 0, H_a: \delta_2 < 0 \quad (2)$$

The cross-correlation assesses how one reference time series correlates with another time series, or several other series, as a function of time shift (lag). Consider two series  $x_i$  and  $y_i$  where  $i = 0, 1, 2, \dots, N-1$ . The cross correlation  $r$  at delay  $d$  is defined as:

$$r = \frac{\sum_i (x_i - m_x) * (y_{i-d} - m_y)}{\sqrt{\sum_i (x_i - m_x)^2} \sqrt{\sum_i (y_{i-d} - m_y)^2}} \quad (3)$$

where  $m_x$  and  $m_y$  are the means of corresponding series.

The Hodrick-Prescott (HP) estimates an unobservable time trend for time series variables. Let  $y_t$  denote an observable macroeconomic time series. The HP filter decomposes  $y_t$  into a nonstationary trend  $g_t$  and a stationary residual component  $c_t$ , that is:

$$y_t = g_t + c_t \quad (4)$$

We note that  $g_t$  and  $c_t$  are unobservables. Given an adequately chosen, positive value of  $\lambda$ , there is a trend component that will minimize:

$$\min \sum_{t=1}^T (y_t - g_t)^2 + \lambda \sum_{t=2}^T (g_{t+1} - g_t) - (g_t - g_{t-1})^2 \quad (5)$$

The first term of the equation is the sum of the squared deviations which penalizes the cyclical component. The second term is a multiple  $\lambda$  of the sum of the squares of the trend component’s second differences. This second term penalizes variations in the growth rate of the trend component. The larger the value of  $\lambda$ , the higher is the penalty. Hodrick and Prescott advise that, for annual data, a value of  $\lambda = 100$  is reasonable.

### **3 Problem solving and discussion**

#### **3.1 Development of government expenditure**

Government expenditure can help in overcoming the inefficiencies of the market system in the allocation of economic resources. It also can help in smoothing out cyclical fluctuations in the economy and influences a level of employment and price stability. Thus, government expenditure plays a crucial role in the economic growth of a country. Government expenditure is incurred in the form of purchases of goods and services, transfer payments and lending. Purchase of goods and services is intended to carry out governmental activities by the direct utilization of economic resources. Transfer payments and lending are intended to provide enterprises and households with purchasing power to enable them to buy goods and services in the market. In many developed countries, transfer payments for social welfare constitute a sizeable portion of government budgets. In developing countries, some of the functions of transfer payments are performed by subsidies to below cost sales by state enterprises.

Government expenditure can be classified into four categories: (i) Functional Classification or Budget Classification (ii) Economic Classification (iii) Cross Classification and (iv) Accounting Classification. Each classification of expenditure in government serves one objective or other i.e. financial control, economic growth, price stability etc. We used functional classification in compliance with the COFOG international standard ("Classification of the Functions of Government") in our analysis. Government expenditure is divided into 10 basic divisions:

T: Total function

C10: General public services

C20: Defense

C30: Public order and safety

C40: Economic affairs

C50: Environment protection

C60: Housing and community amenities

C70: Health

C80: Recreation; culture and religion

C90: Education

C100: Social protection

Firstly we analyzed the total value and structure of government expenditure in each county of Visegrad Group in a period 1995-2009. Results in Table 1 show the existing differences in the size of the public sector in V4 countries.

**Tab. 1: Total government expenditure in % GDP (1995-2009)**

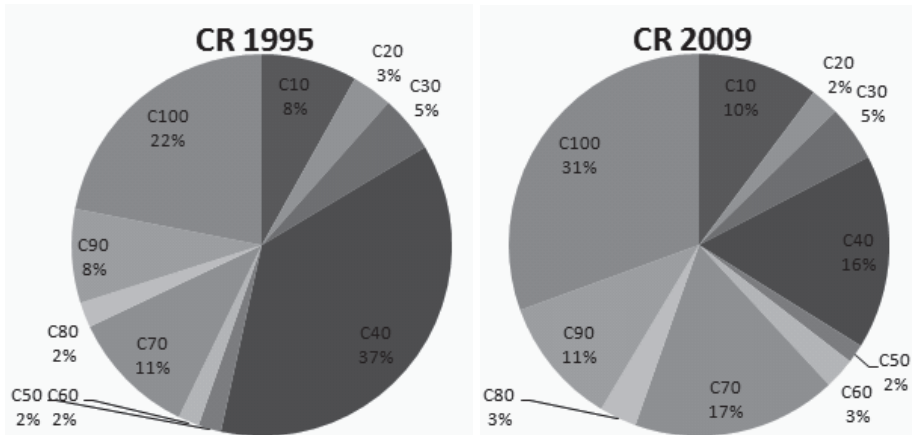
	Czech Republic	Hungary	Poland	Slovak Republic
1995	54.47	55.65	47.71	48.62
1996	42.57	50.61	51.01	53.75
1997	43.20	49.25	46.44	48.93
1998	43.16	50.36	44.34	45.79
1999	42.27	48.39	42.72	48.10
2000	41.82	46.76	41.08	52.14
2001	44.35	47.20	43.8	44.46
2002	46.31	51.18	44.26	45.06
2003	47.32	49.4	44.68	40.13
2004	45.14	48.69	42.62	37.67
2005	44.98	50.21	43.44	37.98
2006	43.75	52.01	43.86	36.62
2007	42.5	49.98	42.19	34.32
2008	42.89	48.82	43.19	34.96
2009	45.95	50.54	44.50	41.54

*Source of data: Eurostat*

Data confirm the trend of decreasing a weight of government expenditure on GDP. From this point of view, Hungary is a country with the highest role of government redistribution, although its role also decreased. Slovak Republic is a country with the lowest share of government expenditure on GDP and it means the smallest size of the public sector. Government expenditure decreased the most in the Czech Republic during the selected period (-8.52 percentage points). Government expenditure is the most stable in Poland.

We also analyzed the structure of government expenditure. Social protection (C100) has the highest share on total government expenditure in all countries (except in the Czech Republic in the year 1995: share of Economic affairs (C40) were higher, Social protection (C100) was on the 2nd position). As for the Czech Republic, the analysis showed that Social protection (C100) was the largest item of government expenditure from 1996, Economics affairs (C40) were on the second and Health expenditure (C70) on the third place till the year 2004. From 2005 the second and the third position has changed.

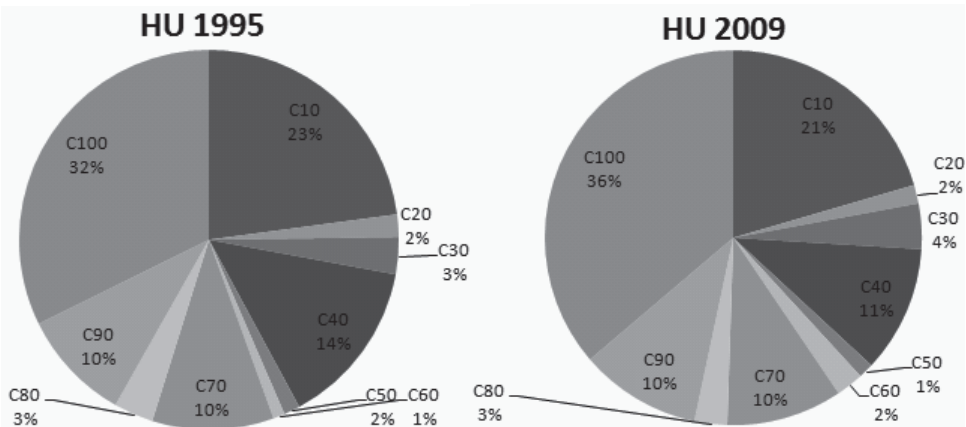
**Fig. 1: Structure of government expenditure in the Czech Republic**



Source of data: based on the data from Eurostat

Order in the Hungary is following: Social protection (C100), General public services (C10) and Economic affairs (C40). See Figure 2 for details about share of each spending category.

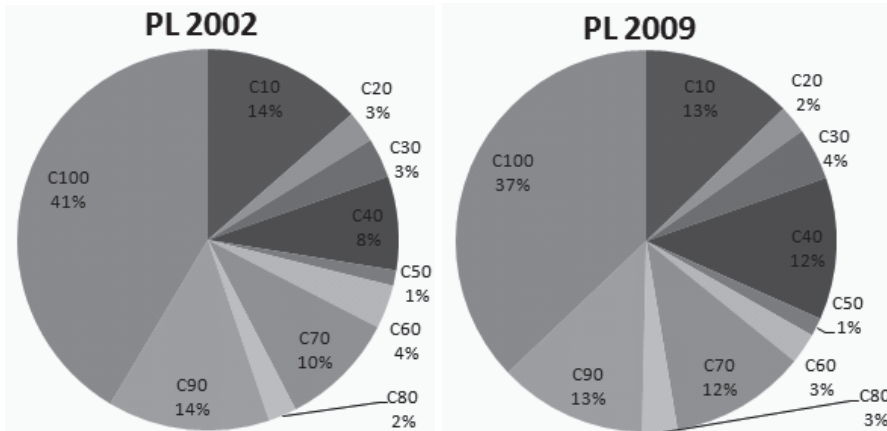
**Fig. 2: Structure of government expenditure in Hungary**



Source of data: based on the data from Eurostat

As you can see in Figure3, the structure of government expenditure is different in Poland. The first position belongs also to Social protection (C100) and its share is higher than in the Czech Republic, Slovak Republic and Hungary. The second position belongs to General public services (C10) and the third to Education (C90) – but Education (C90) was the second and General public services (C10) were the third in 2007 and 2008.

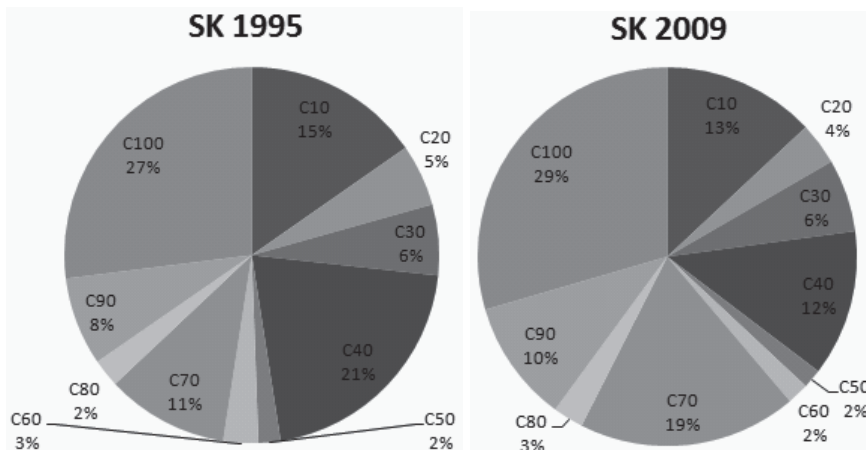
**Fig. 3: Structure of government expenditure in Poland**



*Source of data: based on the data from Eurostat*

We found the most varied results in Slovak Republic. As it was already mentioned, Slovak total government expenditure is the lowest of all analysed countries. Social protection (C100) has the highest share on total government expenditure in all years, but its share on total government expenditure is the lowest in the Visegrad Group although its share has slightly increased. General public services (C10), Health (C70) and Economic affairs (C40) alternately placed on the 2nd and the 3rd position.

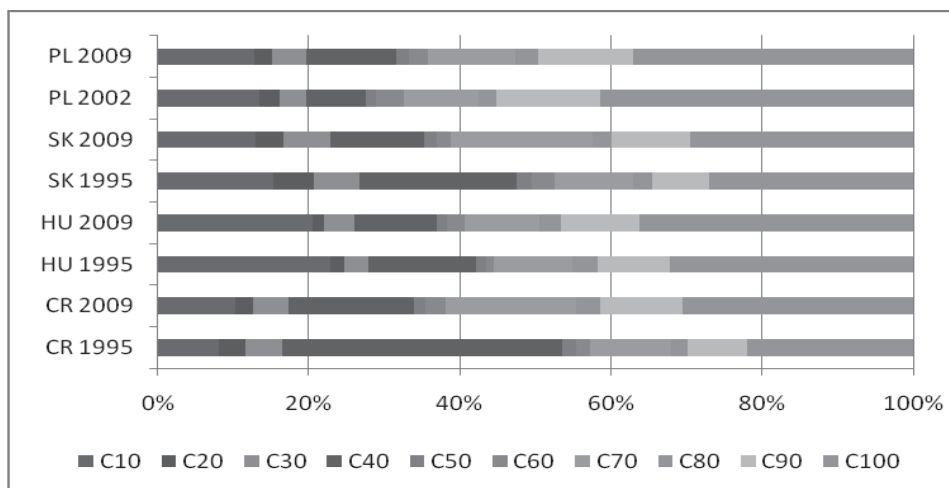
**Fig. 4: Structure of government expenditure in the Slovak Republic**



*Source of data: based on the data from Eurostat*

Figure 5 briefly summarizes structure and the changes of government expenditure in the selected period.

**Fig. 5: Structure of government expenditure in Visegrad Group**



*Source of data: based on the data from Eurostat*

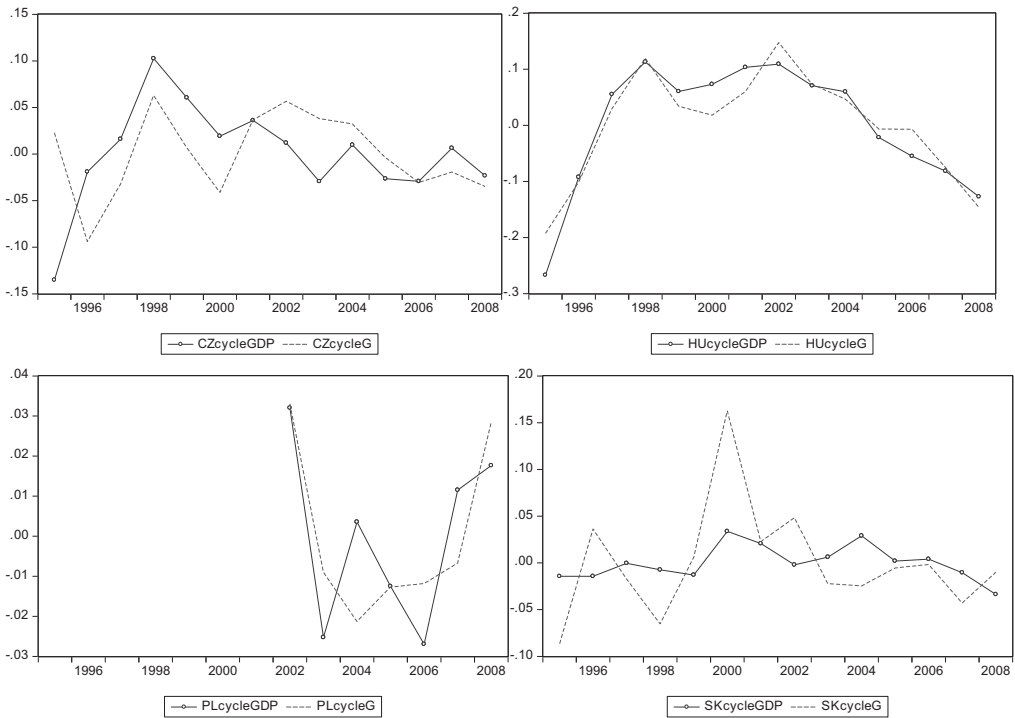
The results suggest that the structure of government expenditure is similar in the Visegrad Group despite the existing differences in the size of the public sector. Expenditure on Social protection has the highest share on total government expenditure in all countries. Data confirm unstable and cyclical development of total government expenditure on GDP in all countries. Five spending functions, on average, account for more than 80% of the total spending: Social protection, Economic affairs, Health, General public services and Education.

### **3.2 The cyclicity of government expenditure**

Next part of the article is focused on the analysis the cyclicity of government expenditure as it is a very important issue too. As was already noted, government expenditure is a possible automatic stabilizer. From this point of view, government expenditure should move in a countercyclical direction. We decided to assess the relationship between GDP and government expenditure and we analyzed the correlation between cycle components of GDP and total government expenditure. Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. The correlation coefficient can vary from -1 to +1. The correlation coefficient -1 indicates perfect negative correlation, and +1 indicates perfect positive correlation. A positive correlation coefficient indicates the procyclicality of government expenditure, negative value means that variables are counter-cyclical and value close to zero express acyclicity. Time series were cyclical adjusted. Firstly we calculated logarithms of variables and then the cycle components were extracted using the Hodrick-Prescott filter. Next Figure 6 shows cycle component of GDP and government expenditure in each country of the Visegrad Group.



**Fig. 6: Cyclically adjusted GDP and government expenditure (V4 countries)**



Source of data: author's calculations based on data from Eurostat

The results indicate significant difference across countries. Only in the Slovak Republic, a correlation coefficient describes a weak negative correlation between government expenditure and GDP and it means that government expenditure is counter-cyclical. Correlation coefficients and the cyclicity of government expenditure are very similar in the Hungary and Poland. Results express strong procyclicality of government expenditure in these countries. Government expenditure is the nearly perfect correlated and procyclical in Hungary. A value of correlation coefficient suggests weak procyclicality of government expenditure in the Czech Republic. Table 2 presents the summary of calculations.

**Tab. 2: Cyclicity of government expenditure**

Country	Correlation coefficient	Correlation	Cyclicity
CZ	0.23	weak positive	procyclical
HU	0.95	strong positive	procyclical
PL	0.73	strong positive	procyclical
SK	-0.25	weak negative	counter-cyclical

Source of data: author's calculations

## Conclusion

Government expenditure plays important role in a fiscal policy of each country as it impacts on overcoming the inefficiencies of the market system in the allocation of economic resources. It also can help to reduce cyclical fluctuations in the economy and influences a level of employment and price stability. Firstly we analyzed the total value and structure of government expenditure in each country of the Visegrad Group in a period 1995-2009. Results confirm the differences in the size of the public sector in V4 countries. The size of the public sector varies from 41.54% of GDP in the Slovak Republic to 50.54% of GDP in Hungary in 2009. Data also confirm the trend of decreasing a weight of government expenditure on GDP.

The results suggest that the structure of government expenditure is similar in the Visegrad Group despite the existing differences in the size of the public sector. Expenditure on Social protection has the highest share on total government expenditure in all countries. Data confirm unstable and cyclical development of total government expenditure on GDP in all countries. Five spending functions, on average, account for more than 80% of the total spending: Social protection, Economic affairs, Health, General public services and Education.

On the other hand the cyclicity of government expenditure differs across the countries in terms of connections with the economic cycle. Government expenditure is the nearly perfect correlated and procyclical in Hungary, and also strong correlated and procyclical in Poland. Government expenditure is weak procyclical in the Czech Republic. Government expenditure is countercyclical in accordance with the theory suggestion only in the Slovak Republic.

The results of the analysis are only the first step for a complex analysis and interpretation of procyclical behavior of fiscal policy in the Czech Republic and selected European Union countries.

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