ECONOMIC GROWTH IN THE EUROZONE AND ON THE BALKANS: A COINTEGRATION ANALYSIS

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Abstract: The global financial and economic crisis of 2008 and in particular the ensuing debt crisis in the euro area in 2009 affected both the economic growth in the euro area and the economic growth in almost all Central and Eastern European countries, including, although to a lesser degree, the Balkan countries. This lower degree of interdependence between most of the Balkan economies and the Eurozone countries is exactly the reason for this study, which aims to determine whether there is a long-term relationship between the economies of the Balkan countries and the Eurozone in general through a co-integration analysis.

Keywords: economic growth, integration, cointegration analysis.

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Introduction

The global economic crisis of 2008 was a serious challenge for the economies of almost all countries in the world but the consequences of the crisis proved to be particularly severe for the euro area countries, where the combination of decades of macroeconomic imbalances and the effects of the global crisis resulted in debt crises in several EU member states. According to Eurostat, the decline of the gross domestic product (GDP) in the Eurozone in 2009 was 4.4% and affected, to varying degrees, the economies of all EU countries but most severely the main trading partners from Central and Eastern Europe. The effects of the global crisis and the debt crisis in the euro area does

not leave the Balkan countries unscathed as the average GDP decline in this region in 2009 was 3.1%.[1]

The subject of this study is the economic growth in the euro area and in the Balkan countries, and its object is the long-term interdependence or integration of the Balkan economies with the economies of the euro area as a whole. The aim of the study is to analyse the data on the economic growth in the euro area and the Balkan countries in order to determine whether there is a long-term relationship between the economic growth of the euro area and the growth of the Balkan economies. The research hypothesis is that some of the Balkan economies are related to a lesser degree to the euro area countries and thus the region is less affected by the negative consequences of the global economic crisis and the resulting debt crises. The existence of long-term interdependence or integration between the economies of the Balkan countries and the economy of the euro area will be examined by means of the Johansen co-integration test.

I. Literature review

In recent years, the aspirations of the Balkan countries for European integration regardless of all political issues and misunderstandings, inevitably passes through economic integration. While the main motivation for such integration for the more developed countries is their economic interests, the motivation of the developing Balkan countries more often stems from their political interests (Marinov, 2015).

Methods for analysis of long-term and causal relationships are widely used in several economic fields. Zdravkovski (2016), for example, examines the short-term and long-term linkage among the equity markets in North Macedonia, Croatia, Slovenia, Serbia and Bulgaria during the period from October 2005 to December 2015. The author has segmented the studied period in terms of the 2008 crisis into pre-, during, and post-crisis period. Johansen cointegration test finds no evidence of cointegration during the pre- and post-crisis periods. However, during the latest financial crises, the empirical findings support the existence of cointegration. The author concludes that "the integration between Balkan stock markets tends to alter over time, particularly during stages of financial disturbances." Kirikkaleli (2016) explores the long-run and causal linkages among economic, financial, and political country risk indicators for seven Balkan countries. The findings reveal that "there is a positive linkage between financial stability and economic stability in the seven

[1] Author's calculations based on data from Eurostat, World Bank National Accounts Data (World Development Indicators), OECD National Accounts Data.

countries in the long run, while financial stability has significant and positive impacts on political stability."

Kjosevski, Petkovski and Naumovska (2016) examined the stability of money demand (M1) in five Western Balkan countries using quarterly data from 2005 to 2014. The authors identify a long-run money demand relationship among real M1 nominal interest rate, exchange rate, inflation and a dummy variable for the effect of the European debt crisis and draw the conclusion that "real money demand in Western Balkan countries was stable in the analyzed period."

Altinay (2017) investigated the real GDP as a function of three factors of production: capital stock, labor and total energy and the aggregate production function for Albania, Bulgaria, Greece, Romania and Turkey. The sample data covers the period of 1960-2014 for Greece and Turkey, and 1971-2014 for Albania, Bulgaria and Romania and the author employs the bounds testing methodology developed by Pesaran (2001) and the autoregressive distributed lag (ARDL) approach to estimate the long-run elasticities. The results reveal that a long- run level relationship among the variables is found for all countries, except for Turkey. Mitić, Kostić, Petrović and Cvetanović (2020) tackle one of the focal issues in recent years – the causal relationships between carbon dioxide emissions, industry, services, and gross fixed capital formation for a panel of Balkan countries over the period 1996-2017. The results of the panes causality suggest a strong cointegration between the variables, meaning that all variables have a long-run relationship with carbon dioxide emissions. The authors find out that there is a short-run bidirectional panel causality running between industry and services, and gross fixed capital formation and services. They draw the conclusion that "environmental taxes, carbon capture and storage, taking part in emission trading schemes and orientation towards renewable energy sources, should further strengthen Balkan countries in achieving environmentally sound economic growth." Using the cointegration approach of Pesaran through ARDL models, Petkov (2009) investigated the long-run causal relationships between Bulgaria's GDP and export from the first quarter of 1996 to the fourth quarter of 2008. According to the author, "the results show that when the indicators are presented at constant prices and no account of the impact of the trend, among them there are two-way causal relationships. With the inclusion of the trend in the model, the hypothesis for the leading role of exports is validated. When real GDP and real exports smoothed with the consumer price index are used, the economic growth has a leading role."

II. Methodology and panel data

The cointegration analysis uses panel data for the annual percentage of GDP growth for the euro area and for the Balkan countries of Bulgaria, Greece, Croatia, Cyprus, Romania, Slovenia, Montenegro, North Macedonia, Albania, Serbia, Turkey, Bosnia and Herzegovina, and Kosovo. The survey covers the period from 2004 to 2020. The main data source is Eurostat and for the periods for which there is no data on the GDP growth of non-EU countries available from Eurostat, the panels are supplemented with data from the World Bank (World Bank National Accounts Data, World Development Indicators) compared to data from the Organization for Economic Co-operation and Development (OECD National Accounts Data). The analysis includes with several other indicators for the economies of these countries over the same period and since the results are similar, here we shall present only the results of the Johansen cointegration test applied to the variable "percentage of GDP growth" using the econometric software application Eviews, v.11.

Cointegration analysis is used to reveal a long-term relationship between non-stationary variables (Kovachevich, 2016). Non-stationary data is data which defines a trend of development and most of the time series of macroeconomic variables are non-stationary. Non-stationary empirical data cannot be used for classical regression analyses to estimate the relationship between the variables (Granger and Newbold, 1974), which is why cointegration analysis is used. In order to apply cointegration analysis, the initial data must be integrated from the first order (Engle and Granger (1987)), i.e. to be transformed into stationary (no "trend", independent of time) using their first differences.

The Augmented Dickey-Fuller (ADF)[2] test was used to determine the order of integration of the time series of GDP growth in the euro area and in the Balkan countries. The lag for the ADF test was estimated using the Akaike information criterion. The test results are shown in Table 1.

[2] Note that to perform the test we need at least 20 observations while the time series we used included less observations.

Table 1

Results from the Dickey-Fuller test for stationarity of the variable in the Balkan countries and the euro area

Country	*Test hypothesis*	*Lag order*	*Variable - GDP growth (%)*
			Significance level
Euro area	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0 (max.= 6)	0.2873>0.05, i.e. the time series is not stationary **0.002<0.05, i.e. the time series is integrated of first order**
Bulgaria	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.4216>0.05, i.e. the time series is not stationary **0.01<0.05, i.e. the time series is integrated of first order**
Greece	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.1428>0.05, i.e. the time series is not stationary **0.0072<0.05, i.e. the time series is integrated of first order**
Croatia	I. H_0 (data is not stationary) H_1 (data is stationary)	0	**0.0359<0.05, i.e. the time series is stationary**
Cyprus	I. H_0 (data is not stationary) H_1 (data is stationary)	1	**0.0203<0.05, i.e. the time series is stationary**
Romania	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.1091>0.05, i.e. the time series is not stationary **0.0002<0.05, i.e. the time series is integrated of first order**

Slovenia	I. H_0 (data is not stationary) H_1 (data is stationary)	0	**0.0186<0.05, i.e. the time series is stationary**
Montenegro	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.1811>0.05, i.e. the time series is not stationary **0.0006<0.05, i.e. the time series is integrated of first order**
North Macedonia	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	1	0.1722>0.05, i.e. the time series is not stationary **0.0069<0.05, i.e. the time series is integrated of first order**
Albania	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.1783>0.05, i.e. the time series is not stationary **0.1730>0.05, i.e. the time series is not integrated of first order but of higher order**
Serbia	I. H_0 (data is not stationary) H_1 (data is stationary)	0	**0.0468<0.05, i.e. the time series is stationary**
Turkey	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.0624>0.05, i.e. the time series is not stationary **0.00<0.05, i.e. the time series is integrated of first order**
Bosnia and Herzegovina	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.4168>0.05, i.e. the time series is not stationary **0.00<0.05, i.e. the time series is integrated of first order**

Kosovo	I. H_0 (data is not stationary) H_1 (data is stationary) II. H_0 (the first differences are not stationary) H_1 (the first differences are stationary)	0	0.3469>0.05, i.e. the time series is not stationary **0.00<0.05, i.e. the time series is integrated of first order**

Source: Author's calculations
**The chosen significance level is 5%.*

Prior to performing the Dickey-Fuller test, we have to perform a check for the presence of "stationarity" and/or "trend" in the time series. The check confirmed the presence of both "trend" and "stationarity" component in the economic growth time series for Bulgaria, North Macedonia, Albania and Bosnia and Herzegovina. In the time series for Kosovo, Serbia, Turkey, Romania and Montenegro there is "stationarity" only, and in the other time series (for the euro area, Cyprus, Greece, Croatia, and Slovenia) there is neither "stationarity" nor "trend".

When applying the ADF test, two groups of hypotheses are tested. The first group of hypotheses checks whether the initial data are stationary - in order to be stationary, the null hypothesis has to be rejected, i.e. the level of significance should be below the 5% level. If the data are not stationary, then the second group of hypotheses is tested - whether the first differences of the initial data are stationary. In order to be stationary, the significance level must be below the 5% level. When applying the test for non-stationarity of the time series, the possible presence of structural breaks was not taken into account. The results of the Dickey-Fuller stationary test show that the baseline data for Cyprus, Serbia, Slovenia and Croatia are stationary, and the data for Albania are integrated of a higher order. Data for all other countries, including the Eurozone, are non-stationary and in particular or integrated of first order, i.e. the first differences of the empirical data are stationary. This allows the Johansen cointegration test to be conducted for all but these five countries.

III. Results from the cointegration analysis

In addition to checking the stationarity of the data, before applying the Johansen cointegration test, it is necessary to select the number of lags of the variables in the equations for each country. For this purpose, the Akaike's information criterion is used in combination with the modified Likelihood Ratio (LR) test (Khim-Sen Liew, 2004). The existence of a long-term relationship

between the tested variables is confirmed by the number of cointegration equations solved with the Johansen test - if at least one equation can be solved, then there is a long-term relationship between the variables. The maximum number of equations cannot be greater than the number of variables. As in this case each test is applied with two variables (the GDP growth of the euro area and the GDP growth of each Balkan country separately), the expected maximum number of equations in the test for each country is one. The results of the Johansen cointegration test are presented in Table 2.

Table 2

Results of the Johansen cointegration test for the Balkan countries and the euro area

Country	***No. of lags***	***No. of cointegration equations hypothesis[3]***	***Trace statistics***	***Critical values at 0.05***	***Significance level/Probability[4]***	***Long-term relationship***
Bulgaria	1	None	12.9013	15.4947	0.1185	No
		Up to 1	1.01116	3.8414	0.3146	
Greece	1	None	23.9304	15.4947	**0.0021**	**Yes**
		Up to 1	2.67399	3.8414	0.1020	
Romania	1	None	16.2068	15.4947	**0.0390**	**Yes**
		Up to 1	1.6329	3.8414	0.2013	
Montenegro	1	None	14.3539	15.4947	0.0737	No
		Up to 1	2.1261	3.8414	0.1448	
North Macedonia	1	None	11.0523	15.4947	0.2083	No
		Up to 1	2.4939	3.8414	0.1143	
Turkey	1	None	24.0267	15.4947	**0.0021**	**Yes**
		Up to 1	5.78277	3.8414	**0.0162**	
Bosnia and Herzegovina	1	None	22.9905	15.4947	**0.0031**	**Yes**
		Up to 1	2.96353	3.8414	0.0852	
Kosovo	1	None	17.3848	15.4947	**0.0257**	**Yes**
		Up to 1	0.68509	3.8414	0.4078	

Source: Author's calculations

The presence of a long-term relationship shows that the economies of the countries/zones are interrelated and have the same long-tern trends although certain deviations are possible in the short run. Thus, for the eight Balkan countries surveyed, three of which are members of the European Union and one is a member of the euro area, the results proved the expectations that there is a

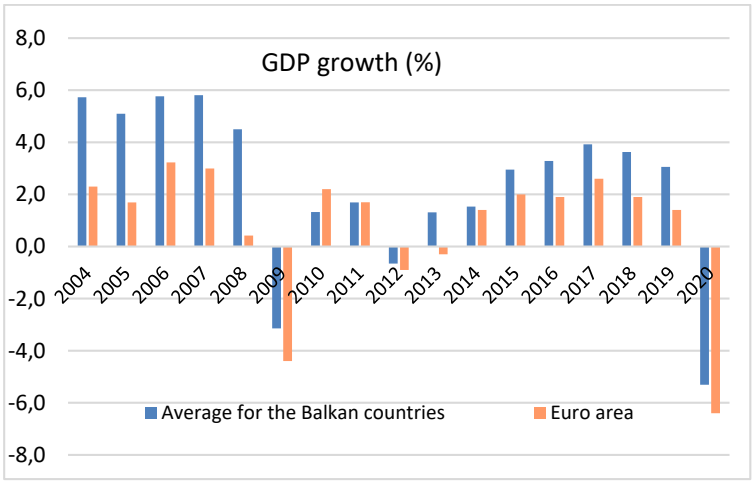
[3] Lack of cointegration equations means that there is no long-term relationship between the variables.

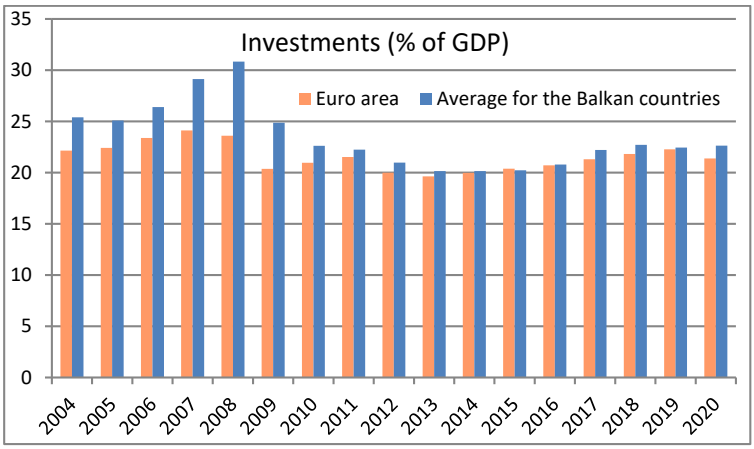
[4] The significance level should be less than 0.05 for the alternative hypothesis that there is a long-term relationship between the variables to be accepted.

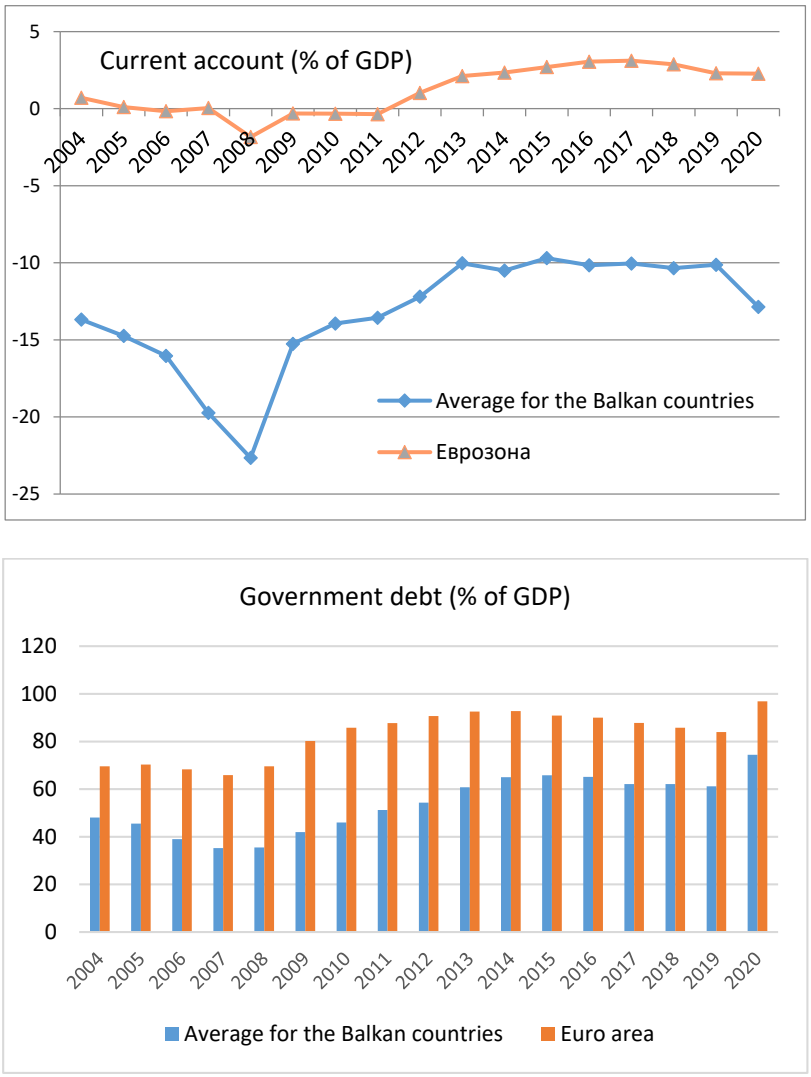
long-term relationship between the GDP growth of the euro area and that of Greece (which is a member of the euro area). There is also a long-term linkage between the GDP growth of the euro area and that of Romania, which is currently a member of the EU only. Although Bulgaria is also a member of the EU, the Johansen test does not show a long-term relationship between the growth of its GDP and that of the euro area.

According to Johansen's cointegration test results, three of the other five non-EU countries (Kosovo, Turkey and Bosnia and Herzegovina) have long-term relationships, while other two (Montenegro and North Macedonia) do not have a long-term relationship.

The lack of long-term linkage of the economies of some of the Balkan countries with the economy of the euro area also contributes to the weaker transfer of negative effects from the global economic crisis and the debt crisis in the euro area to this region as a whole (Figure 1).







Source: Author's calculations, data from the International Monetary Fund, World Economic Outlook 2021

Figure 1. ***Main economic indicators of the Balkan countries (average) and the Euro area***

In the aftermath of the global economic crisis of 2008 and the debt crisis of 2009, the Balkan economies are recovering faster in terms of their GDP growth and current account balances. When considering the indicators, we should bear in mind that the average values for the Balkan countries include the indicators of the three members of the euro area (Greece, Cyprus and Slovenia), two of which were among the most severely affected countries by the crises of

2008 and 2009, which lowers the indicators for the region as a whole and yet they are still higher than those of the Eurozone. The growing government debt and declining investment levels on average in the Balkan countries are largely due to the deteriorating indicators of Greece and Cyprus.

Conclusion

The results of Johansen's cointegration test show that there is a long-term linkage between the GDP growth in the euro area and that in some of the Balkan economies, i.e. in Greece, Romania, Kosovo, Turkey and Bosnia and Herzegovina whereas there is no long-term linkage with the GDP growth in Bulgaria, Montenegro and North Macedonia. The cointegration analysis can be supplemented with a Granger causality test, which can confirm or reject the direction of influence between variables, as well as with a test for long-term relationships between indicators of different integration orders, such as autoregressive distributed lag (ARDL) models approach.

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