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Original Scientific Article

UNEMPLOYMENT RATE AND GDP GROWTH RATE IN SELECTED EUROPEAN COUNTRIES

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Abstract: *GDP growth rate and unemployment rate are two crucial macroeconomic variables - their correlation is an important indicator for policymakers and it has been frequently analyzed. This research aims to analyze the GDP growth rate and unemployment rate in EU founders, Visegrad group, and Western Balkan countries and to determine if the negative correlation between these variables exists, to point to differences between developed and developing countries, and to indicate real convergence of developing countries towards developed ones. Data is analyzed on a quarterly level from Q1 2010 to Q4 2021 and the methodology of this paper consists of empirical data analysis, descriptive statistics, and panel analysis for each country group. Obtained results point to a negative correlation in all 3 country groups, but it is statistically significant only in EU founders countries, and the convergence of the Visegrad group and Western Balkan countries towards developed ones can be acknowledged.*

Keywords: *GDP growth rate, Unemployment rate, Okun's law, EU founders, Visegrad group, Western Balkans.*

JEL Classification E00 · E24 · E60 · F00 · J64 · C33

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1. INTRODUCTION

Economic growth and high employment are crucial for the development of every country and their correlation and movement are known to be important indicators for policymakers. Economic theory is trying to define the correlation between important macroeconomic indicators and present it by some conditional relation. Among two important macroeconomic indicators which have been frequently examined are the GDP growth rate and unemployment rate and their causal relation.

The subject of this research is the unemployment rate and GDP growth rate in the following 3 groups of European countries: EU founders (Belgium, Netherlands, Luxembourg, Germany, France, and Italy), Visegrad group countries (Hungary, Poland, Czech Republic, and Slovakia) and Western Balkan countries (Croatia, Montenegro, North Macedonia, and Serbia). All countries are analyzed from Q1 2010 until Q4 2021. Data is analyzed on a quarterly level: the unemployment rate has been taken from Eurostat, and it is presenting unemployment from 15 to 74 years. For Montenegro, only for 2010 and 2021, unemployment rate data has been taken from Monstat (Statistical Office of Montenegro). GDP growth rate data has been fully obtained by Eurostat, and it represents a percentage change compared to the same period the previous year.

This research aims to determine whether there is a negative correlation between the unemployment rate and GDP growth rate, to determine differences between developed (EU founders) and developing countries (Visegrad group and Western Balkan countries), and to point to real convergence between developing countries towards developed ones.

The methodology of this research consists of presenting and analyzing data for the unemployment rate and GDP growth rate for each country, descriptive statistics and panel analysis for each country group, and a comparison of obtained results. Statistical software STATA was used for econometric analysis and the significance level is at 5%.

For panel analysis, the unemployment rate is a dependent variable, whereas the GDP growth rate is an independent variable. The analyzed model can be defined as:

$$Yit = \alpha + \beta xit + \mu it \quad (1)$$

Where Y stands for the dependent variable unemployment rate, α is constant, β is the coefficient of the independent variable, x is the independent variable GDP growth rate, μ is residual, i presents a number of countries that are part of the analysis, t=time frame of analysis.

The following hypotheses are defined in this paper.

H1: *There is a negative causal relationship between economic growth and unemployment rate in analyzed European country groups.*

H2: *Developing countries are converging towards developed countries with an increase in GDP growth rate and a decrease in the unemployment rate.*

This paper is divided into five parts. The first part is the introduction, where the subject, aim, and methodology of the research are presented, as well as analyzed models and hypotheses. The second part is the literature review, with the review of GDP growth rate, unemployment rate, Okun's law,

and the results and research about these two variables and their correlation in European countries. The third part consists of presenting and analyzing empirical data for EU founders, Visegrad, and Western Balkan countries. In the fourth part are presented corresponding panel models and scatter plots for all 3 country groups and a discussion of results. The last part of the paper is the conclusion where final remarks are provided, as well as suggestions for further empirical research.

2. LITERATURE REVIEW

Two important macroeconomic variables, which illustrate the health and prosperity of an economy are GDP and unemployment rate. Gross domestic product (GDP) is one of the essential economic indicators since it represents a country's performance based on production factors located within the national territory. It represents overall performance, and what was produced and purchased in the economy, and it affects many other variables (Ivanova & Masarova, 2018, p. 270). Unemployment can be defined as a state where the working-age population has no job and they are actively searching for one (Chowdhury & Hossain, 2014). Postulate which links these two variables is known as Okun's law. Okun's law indicates that there is a negative relationship between unemployment and output. It was defined in 1962 by A. Okun for the US economy when he reported that an increase of 1% of GDP will lead to an unemployment decrease of 0,3% (Halebić, 2021).

A positive correlation between GDP and employment rate in European Union countries has been empirically confirmed by Cvijanović et al. (2019) by regression analysis during the period Q4 2017 - Q3 2018. Vladušić et al. (2019) analyzed unemployment and GDP growth rates in EU Member States in the last quarter of 2017 and the first three quarters of 2018. The unemployment rate was lowest in the Czech Republic in the EU (less than 3%) and it was followed by Malta, Germany, Hungary, and the Netherlands, which had an unemployment rate of up to 4%. The United Kingdom (part of the EU during the analysis), Poland, Romania, and Denmark had an unemployment rate below 5%; Austria, Bulgaria, Slovenia, and Luxembourg were around 5%. The average unemployment rate in the EU was 7,1% but more than two-thirds of countries had a lower unemployment rate, which is due to high unemployment in Greece (20,6%). Most EU member countries during this period had positive GDP growth on a quarterly level, but below 1%. Negative growth rates are noted in Germany, Italy, and Lithuania. Obtained results point to a regression model: *Employment = 1,76 + 0,608 * GDP.*

Belgium, which is one of the EU founders countries, had an unemployment rate which had declined in 2011, then during the euro-crisis in 2012-2013, unemployment increased at the beginning of 2012, reaching its peak in April 2013 (8,5%) and then kept on the steady level until mid-2015. As of this period, it has started to decline again. The main problem when it comes to Belgium's unemployment is that almost half of the unemployed are unemployed for more than 12 months (Bodart et al., 2018).

Visegrad Group countries have transformed from centrally planned to market economies. They have performed reforms regarding institutional systems and joined the EU in 2004. Since these economies have opened, changes in the labor market became visible as well. Poland, the Czech Republic, and Slovakia after joining the EU were constantly improving the labor market situation until the financial crisis interrupted. On the other hand, Hungary's labor market did not benefit as much from entering the EU, since the unemployment rate was still growing after 2004. The financial crisis negatively influenced all labor markets, but in Slovakia, it made the strongest negative impact. The Czech Republic is characterized as the country with the most stable labor market and lowest unemployment rate (Hadas-Dyduch et al., 2016).

Kowalska et al. (2018) conducted an analysis of the GDP growth rate in Visegrad group countries and the results have shown that the Czech Republic has the strongest position among Visegrad group countries, but it is getting weaker every year because of the slow growth rate after the financial crisis in 2008. Slovakia has been getting closer to Poland in recent years. Analysis of FDI inflow (which highly contributes to the country's GDP growth) in Visegrad group countries during 1980-2018 leads to the conclusion that 44% of FDI was directed to Poland, 23% to the Czech Republic, 21% to Hungary, and 11% to Slovakia (Kemiveš & Barjaktarović, 2021).

After 2010, Hungary made great progress and was on the right path to convergence, with a rising employment rate, decreasing unemployment rate, improving budget balance and government debt, and restoring external equilibrium. Hungary's GDP has been growing for many years, rising faster than average developed countries. Between 2013 and 2018, Hungary's GDP rose by 23% in total. In 2018, the unemployment rate was 3,7% with a significant decline in youth unemployment (Matolcsy & Palotai, 2019).

The GDP growth rate in the EU was 1,9% in 2014 and 2,7% in 2017, which is a satisfying level since those are highly developed countries. Based on Western Balkans Regular Economic Development publications, during the period 2014-2018, Serbia's GDP growth rate was below average and in 2018 on an average level (compared with Albania, Bosnia and Herzegovina, Montenegro, and North Macedonia) (Milojević, 2019).

Nikolić and Zoroja (2016) analyzed the correlation between Germany's and Serbia's economic growth during Q1 2004 – Q2 2015 by the Vector Error Correction model (VECM). They have confirmed that Serbia's economic activity, in the long run, is linked to economic activity in Germany: if the GDP in Germany had increased by 1%, Serbia's GDP would increase by 0,99%. Germany's economy is not affected by Serbia's, which is in accordance with smaller economies being dependent on larger economies, and not *vice versa*.

Structural unemployment in Serbia has its roots in collective heritage. Low output is causing long-term high unemployment, and the financial crisis has only amplified those effects. Insufficient capital mobility and inactive institutions in the labor market are additionally making a bad impact on unemployment (Ristanović & Barjaktarević, 2014).

Tumanoska (2019) conducted research on examining the validation of Ocun's law in North Macedonia, based on data from 1991 to 2017. Between total unemployment and GDP growth, there is a long-run relationship between these two variables, suggesting that an increase of 1% of GDP leads to a decrease of 2,57% in the unemployment rate. For youth unemployment, there is no co-integration between these two variables in the long run, but testing in the short run pointed to an insignificant coefficient, meaning that these two variables are not co-integrated.

Less developed European countries tend to converge towards developed countries. Convergence is a process where the difference between two or more variables over time decreases and becomes negligible. Countries with lower real GDP per capita have higher growth rates that cannot be attributed to some other characteristics of those economies (Strielkowski & Hoschle, 2016). A degree of economic convergence between European economies is needed for a well-functioning monetary union. If there are large differences between countries, achieving common goals is more difficult (Iorio & Triacca, 2022).

3. EMPIRICAL DATA ANALYSIS

For each country, empirical data has been analyzed on a quarterly level for the unemployment rate and GDP growth rate. The unemployment rate (unemployment from 15 to 74 years) has been taken from Eurostat for all countries, except for Montenegro, where data has been taken from Monstat (Statistical Office of Montenegro) for 2010 and 2021. GDP growth rate data has been fully obtained by Eurostat, and it represents a percentage change compared to the same period the previous year.

3.1. EU Founders Countries

Figure 1 presents the movement of the unemployment rate and GDP growth rate for 6 EU founders' countries from Q1 2010 until Q4 2021. What can be easily noticed is the following: (1) all countries have similar and unique movement for unemployment rate and GDP growth rate during observed years (similar movement, but on different percentage levels) except Luxembourg; (2) movement of these two variables in Luxembourg has been more volatile compared to other EU founders countries; (3) all countries have faced GDP growth rate decline as from 2011, which lasted until Q1 2013; (4) all countries have faced a decline of GDP growth rate as from Q1 2020 when COVID-19 pandemic has begun, which led to increasing of unemployment rate in following quarters; (5) as from Q2-Q3 2020, GDP growth rate has noted its increase, which resulted in unemployment decrease in quarters which have followed.

Figure 1. Unemployment rate and GDP growth rate in EU founders countries
Source: Author's calculation based on Eurostat data

Table 1. Descriptive statistics – EU founders' countries

Variable		Mean	Std. Dev.	Min	Max	Observations
Unemployment rate	Overall	7,251736	2,45219	2,9	13	N = 288
	Between		2,35882	4,35	10,63542	n = 6
	Within		1,166357	4,616319	10,00174	T = 48
GDP growth rate	Overall	1,347222	3,546986	-18,7	19,4	N = 288
	Between		,8169766	,0583333	2,6125	n = 6
	Within		3,467414	-18,50069	19,59931	T = 48

Source: Author's calculation in STATA

Table 1 presents descriptive statistics, which present the mean, standard deviation, minimum and maximum for the unemployment rate and GDP growth rate. The number of observations is 288 and the data is balanced (analyzed 6 countries during 48 quarters).

3.2. Visegrad Group Countries

In Figure 2 is presented data for Visegrad group countries. The following observations can be noticed: (1) constant decline of unemployment rate in all countries; (2) relatively uniform movement of GDP growth rate; (3) all countries have faced a GDP growth rate declined from 2011, which lasted until Q1 2013; (4) all countries have faced GDP growth rate decline as from Q1 2020, which led to increasing of unemployment rate in following quarters; (5) as from Q3 2020, GDP growth rate has started to increase, which led to unemployment decrease in quarters which have followed. An interesting observation is that Slovakia is the only country (out of all analyzed countries in this research), which did not have a negative GDP growth rate until the pandemic outburst.

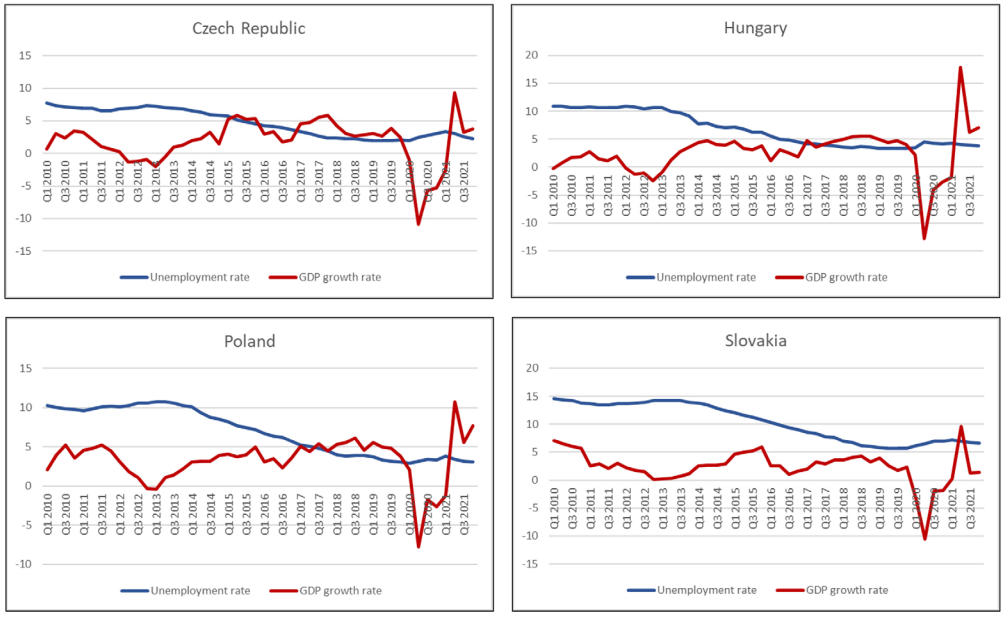

Figure 2. Unemployment rate and GDP growth rate in Visegrad group countries
Source: Author's calculation based on Eurostat data

Table 2. Descriptive statistics – Visegrad Group countries

Variable		Mean	Std. Dev.	Min	Max	Observations
Unemployment rate	Overall	7,132813	3,510451	2	14,6	N = 192
	Between		2,354038	4,6375	10,31667	n = 4
	Within		2,854012	2,516146	11,41615	T = 48
GDP growth rate	Overall	2,545052	3,365604	-12,8	17,8	N = 192
	Between		,597322	1,883333	3,329167	n = 4
	Within		3,325402	-12,81016	17,78984	T = 48

Source: Author's calculation in STATA

Table 2 presents descriptive statistics – the number of observations for Visegrad group countries is 192.

3.3. Western Balkan Countries

Movement of unemployment rate and GDP growth rate has led to following conclusions in Western Balkan countries: (1) unemployment rate in Montenegro was stable in the past 11 years and in other three Western Balkan countries that are analysed, unemployment rate has had descending path; (2) GDP growth rate had more oscillations during past years; (3) comparing to EU founders and Visegrad countries, decrease of GDP growth rate in period 2011-2013 has not been as sharp; (4) all countries have faced GDP growth rate decline as from Q1 2020 (highest decline has been noted in Croatia and Montenegro, since their economics are greatly impacted by tourism, which was one the most affected branches of economy by pandemic), which led to increase of unemployment rate in following quarters; (5) as from Q3 2020, GDP growth rate has noted its increase (GDP growth rate reached 16,5% in Croatia in Q2 2021 and in Montenegro 27,1% in Q3 2021), which led to unemployment decrease in quarters which have followed.

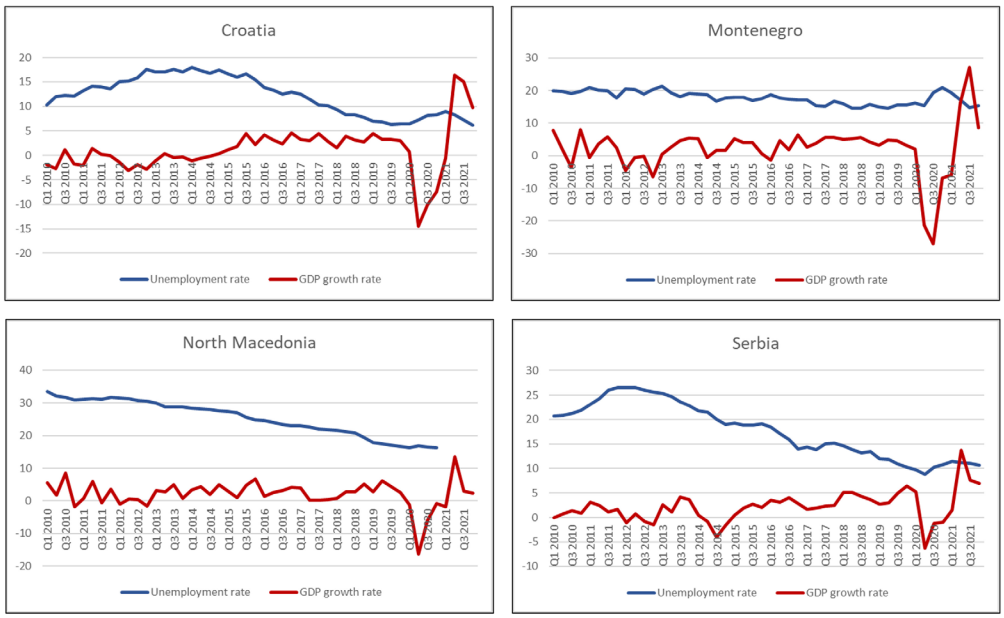

Figure 3. Unemployment rate and GDP growth rate in Western Balkan countries

Source: Author's calculation based on Eurostat data and Monstat (Montenegro unemployment rate data for 2010 and 2021)

The consequences COVID-19 has left on Western Balkan reflected decreased domestic demand and supply, decreased export, and investments (both domestic and foreign), restricted international travel, which made a huge impact on tourism-oriented countries, and a fall of remittances (Georgieva Svrtinov et al., 2020).

Panel data for Western Balkan countries are not balanced, and the number of observations for the unemployment rate is 188 (North Macedonia data is presented without unemployment rate for 2021) and for GDP growth rate 192 (4 countries during 48 quarters). Descriptive statistics is presented in Table 3.

Table 3. Descriptive statistics – Western Balkan countries

Variable		Mean	Std. Dev.	Min	Max	Observations
Unemployment rate	Overall	18,11436	6,375107	6,2	33,5	N = 188
	Between		5,367368	12,22917	25,3	n = 4
	Within		4,420321	9,014362	26,96645	T = 47
GDP growth rate	Overall	1,902083	5,267404	-26,9	27,1	N = 192
	Between		,5141094	1,139583	2,239583	n = 4
	Within		5,248455	-27,2375	26,7625	T = 48

Source: Author's calculation in STATA

When Serbia is compared to EU countries, its economic development and living standard are at the bottom. GDP per capita is half of other Central and Eastern European countries and when compared to developed Western European countries, this proportion is even lower and one third. In order to start catching up with CEE countries, Serbia's GDP growth rate should be higher, but it is the opposite since the gap is only increasing. 26 EU countries were analyzed by the panel during 1995-2017 and Serbian data has been later added to the model in order to determine how different factors affect Serbian economic growth. Serbian GDP structural gap is around 1,5-2 p.p. (for less developed EU countries, the GDP growth rate is higher than in developed countries by around 2 p.p.). The highest negative impacts on economic growth are corruption (1 p.p.), rule of law gap, low investment, and a poor educational system (1 p.p.). If dealing with corruption and improving the rule of law would increase to the level of surrounding countries, economic growth would increase by about 0,5 p.p., but if it would reach the level of all CEE countries, the growth rate would exceed by 0,9 p.p. Bad indicator regarding corruption is that as of 2014 Serbia went from gradual improvement in control of corruption and rule of law to their deterioration. Serbia's share of investments into GDP is lower compared to CEE countries, which is causing a decrease in economic growth of around 0,7 p.p. When it comes to education, it is on average 11 years of schooling, which is around 1 year less than average CEE countries (impacting 0,2 p.p. GDP loss) (Petrović et al., 2019).

4. RESULTS AND DISCUSSION

For each country group panel analysis contained OLS the model, Fixed Effects, and Random Effects Model. For EU founders countries, the corresponding model is the OLS model, since it is the only statistically significant model, whereas, for the Visegrad group and Western Balkan countries, the Hausman test has shown that Random Effects Models are more suitable than Fixed Effected Models. In Table 4 are presented corresponding models for all 3 country groups.

Table 4. Corresponding models for EU founders, Visegrad group, and Western Balkan countries

	EU founders	**Visegrad group**	**Western Balkan**
Corresponding model	OLS model	Random Effects Model	Random Effects Model
P-value	0,0323	0,2606	0,1335
GDP growth rate (coefficient)	-0,0872481	-0,0701878	-0,0930864
GDP growth rate (Std. Err.)	0,0405532	0,0623906	0,0620329
GDP growth rate (t-value)	0,032	0,261	0,133
Constant (coefficient)	7,369279	7,311444	18,43453
Constant (Std. Err.)	0,1536343	1,402901	2,86442
Constant (t-value)	0,000	0,000	0,000

Source: Author's calculation in STATA

When it comes to EU founders countries, the OLS model is the only model which is statistically significant (p=0,0323; p<0,05), and the t-value meets this criterion as well (GDP Growth rate and constant t-value<0,05). OLS Model points to ***Unemployment rate = 7,369279 – 0,0872481*GDP Growth rate***, meaning that an increase in GDP Growth rate for 1% would lead to a decrease of the unemployment rate for 0,0872481%, which is close to zero, so even though the negative correlation is statistically significant, the impact that GDP growth rate has on the unemployment rate is so low, that can be neglected.

For the Visegrad group and Western Balkan countries, Random Effects Models are not statistically significant (p=0,2606 and p=0,1335 respectively), but both models show a negative correlation between the unemployment rate and GDP growth rate.

In Figure 4 are presented scatterplots for all 3 analyzed country groups. All country groups have a negative correlation between the unemployment rate and GDP growth rate, meaning that an increase in the GDP growth rate will lead to an unemployment rate decrease.

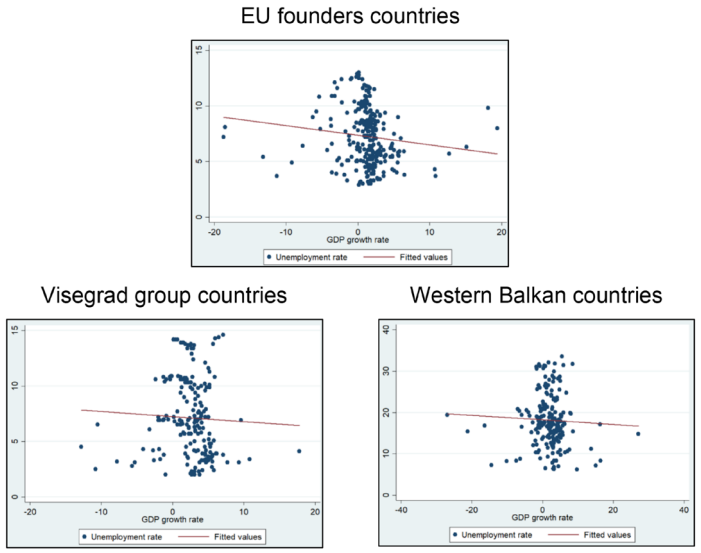

Figure 4. Unemployment rate and GDP growth rate scatter plot
Source: Author's calculation in STATA

In all analyzed countries, the unemployment rate had a more stable movement over the past 12 years compared to the GDP growth rate, which had many oscillations. There have been 2 points in time when all countries faced a similar trend regarding GDP growth rate. The first point was from 2011, when the GDP growth rate decline started, which lasted until Q1 2013. This was due to the Eurozone debt crisis which reached its peak during this period. A lower decline was noted in Western Balkan countries, compared to the other two groups of countries, since they were not part of the monetary union. The second decline in GDP growth rate started in Q1 2020 together with the global COVID-19 pandemic. Because of the closing borders, few economic branches being completely shut down (mostly tourism and related sectors), the decline in international trade, and overall fear of what future months will bring, this has led to an increase in the unemployment rate a few months after the beginning of the pandemic. After Q3 2020 the unemployment rate slowly started to decline. The employment rate increase is stimulated by economic development, and in developing countries that have been affected by global and internal crises, the negative effects of recession last much longer compared to developed countries (Vukadinović et al., 2018).

The overall standard deviation for both the unemployment rate and GDP growth rate is highest in Western Balkan countries. This points to developed countries deviating less one from another, which is the opposite for developing countries, where deviations are high.

The convergence of less developed countries (Visegrad group and Western Balkan countries) towards developed countries (EU founders) is emphasized. Visegrad group countries have noted a high GDP growth rate from 2015 (Hungary as of 2014) with an average of 4% GDP growth rate until the COVID-19 pandemic in 2020. A high GDP growth rate led to an unemployment rate decrease. When it comes to the Czech Republic, in the past few years the unemployment rate has been less than 3%, which makes it a Visegrad group country with the lowest unemployment rate. On the contrary, Slovakia has the highest unemployment rate which was caused by the lowest GDP growth rate. Visegrad states have received high FDI inflow from the beginning of the 2000s (with Poland in the first place), which led to a higher GDP growth rate, as empirically proven by Ercegovac and Beker Pucar (2021).

Western Balkan countries had a lower average GDP growth rate from 2015 until the beginning of 2020, which caused a higher unemployment rate compared to Visegrad group countries. The average GDP growth rate was lower than 3,5%. Croatia, as the most developed Western Balkan country and only EU member, has significantly lowered the unemployment rate in the past few years, whereas in North Macedonia, even though a great impact has been made regarding lowering the unemployment rate, it is still really high (16% at the end of analyzed period). Serbia cannot praise its progress in the past few years, since the GDP growth rate has not been high enough to accelerate its convergence towards EU member countries.

An important note about the unemployment rate decrease in less developed countries (Western Balkan and Visegrad group) is that unemployed citizens migrate to developed EU countries and search for a job abroad. This has been the case with Visegrad group countries and Croatia, since entering the EU has enabled those countries to open borders and much easier fluctuations. Besides new EU members, this is the case with Western Balkan countries as well, which are known for a high percentage of their citizens working abroad. This is leading to a fictive unemployment rate decrease and causing an unclear picture of the actual unemployment rate in developing countries.

For developing countries to converge, high GDP growth is needed to reach a level of developed countries and a higher GDP growth rate would lead to an increase in employment. Youth employ-

ment is an important factor since it not only stimulates employment increase but also has a positive effect on other social matters. Higher investments (foreign and domestic) would make an impact on the GDP growth rate, which would eventually lead to an increase in wages and consumption, which is also part of the real convergence.

5. CONCLUSION

GDP growth rate and unemployment rate are important macroeconomic indicators, not only for policymakers but also for all citizens, households, and the overall country's economy, since they have an impact on the prosperity of all stakeholders. The main focus of policymakers should be to encourage unemployment decrease through various subsidies, programs, etc., and to enhance the GDP growth rate through new investments and opening new jobs.

The subject of this research has been the unemployment rate and GDP growth rate in EU founders, the Visegrad group, and Western Balkan countries from 2010 until 2021. Obtained results have pointed to a statistically significant negative correlation between the unemployment rate and GDP growth rate in EU founders countries, but the impact the GDP growth rate has on the unemployment rate is close to zero. In the Visegrad group and Western Balkan countries, the correlation is negative, but not statistically significant.

Real convergence of the Visegrad group and Western Balkan countries is noticed through higher GDP growth rates and a decline in unemployment. Western Balkan countries are lagging behind Visegrad group states since Visegrad group countries had higher GDP growth rates and lower unemployment rates. In the future, if developing countries want to converge towards developed EU countries, besides focusing on GDP growth and unemployment decrease, attention should be paid to the positive current account, lowering the budget deficit and public debt, healthy fiscal policy, and public finance, stimulant towards the economy through lowering income tax and providing different types of subsidies.

Hypothesis H1 can be fully neither accepted nor declined. For EU founders, the Visegrad group, and Western Balkan countries, a negative causal relationship is presented, but it is statistically significant only within EU founders' countries and even there the effect GDP growth makes on the unemployment rate is close to zero.

Hypothesis H2 can be accepted since developing countries are converging towards developed countries. Western Balkan countries still have a long way to go to reach the Visegrad group countries' development level, not to mention the most developed EU countries.

Since the development gap between Western Balkan countries and Visegrad group countries is still significant, Western Balkan countries should focus on achieving Visegrad group countries' development level and converging towards them – these two country groups are more comparable and have more similar economic indicators.

The proposal for further research is to examine the GDP growth rate and employment rate correlation to conclude if there is a statistically significant correlation between these two variables and to analyze Western Balkan convergence towards Visegrad group countries.

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