



INFLATION AND UNEMPLOYMENT INTERDEPENDANCE: EVIDENCE FROM THE WESTERN BALKAN COUNTRIES

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UDC
330.342 1
331.5
336.3

Original
scientific
paper

Abstract: The discussion over the relationship between the inflation, unemployment and economic growth has been relevant over the centuries to a wide range of economic interests. It is agreed among the researchers and economists that reaching the price stability, *ceteris paribus*, will have a beneficial effect on employment and economic prosperity measured with GDP growth, particularly under the assumption of identifying and maintaining an optimum sill. However, as achieving the ideal deal is quite challenging to the monetary authorities and the unemployment keeps to be one of the main obstacles across the globe, particularly for emerging economies, assessing the relationship among these variables remains in the focus of economic audience. Thus, the aim of this study is to examine the interdependence between the inflation, unemployment and economic growth through an empirical assessment of the inverse relationship between the first two and testing the validity of the Okun's law for the sample of the Western Balkan (WB) countries and the European Union as a whole. For this purpose, the panel data available on the World Bank platforms for the time period from 2006 to 2021 were used. In addition, aiming to assess the contribution of unemployment and inflation to GDP growth, the regression analysis was performed based on the standard model. The findings of this research confirm the trade-off between inflation and unemployment for all examined countries (Serbia, B&H, Montenegro, Albania) and the EU, except for North Macedonia. Differently, mixed results were obtained considering the Okun's law. While some results confirm the validity of this law, other disprove it. The results of the regression analysis for all countries show that a rise in inflation and drop in unemployment positively contribute to the countries' GDP growth.

Received:
15.10.2023
Accepted:
30.11.2023

Keywords: inflation, unemployment, interdependence, trade-off, Western Balkans, EU

JEL classification: E60, O11, O4.

1. Introduction

The inflation and unemployment have been considered to be among the most momentous macroeconomic variables whose values tendentiously reflect the modifying economic conditions and shift in the economic cycles. The everlasting questioning on their relationship and connectivity with economic growth has been in the focus of economists' arguments over the centuries. The dispute on their linkages remains relevant among the economic researchers and policy makers as unemployment continues to be one of the key challenges in the global and emerging economies across the globe. In such discourse, it has been a common stand that reaching a price stability, with all the other parameters maintained unchanged, is expected to have a fruitful effect on both unemployment and economic growth, primarily in the case when the optimum sill could be found. Nevertheless, as achieving an ideal match between the two seems to be one of the most challenging goals, governments across the world invest efforts to reinforce employment thresholds avoiding to disturb the attained price stability.

The relationship between the unemployment and inflation, being not a new phenomenon in a short run economic trends diagnostics, was first determined by A.W. Philips (Philips, 1958) as a trade-off between the two variables indicating that any decrease in unemployment arises only at the cost of an increased inflationary pressures in the economy (Philips curve). Such a theoretical postulate has been therefore seen for long by economic policy creators and central banks representatives as a sound ground for economic stimuli implementation aimed at an increase in aggregate demand, employment rate and consequently gross domestic product (GDP) through pursuing expansionary monetary or fiscal policy. Differently, by exhausting an excess demand, the authorities could achieve the price stabilization goal at the expense of an increase in unemployment (Jeke & Wanjuu, 2021).

The distinguished linkage of the two variables is considered to be a useful signaling tool which indicates a change in the economic cycle of an economy. Accordingly, while the period of recession is accompanied with a high unemployment rate, being a reflection of the rise in consumer prices, that gradually falls through a recovery stage, a turn to economic growth is associated with an increase in prices and in inflation rate. Hence, the peak of economic cycle is characterized with convergence of the two parameters values, i.e. the decrease in the value of the inflation and employment rate. The slowdown of the economic growth during the shift from the pick to recession stage is followed with the decline in the demand, increase in unemployment and flatter price increase, thus resulting with the

recession that is associated with the increase in the gap between the unemployment and inflation rate. Accordingly, a value of the gap could be seen as a signaling indicator which point out the stage and the progress on the economic development path in an economy (Hronova et al., 2021).

For substantial period of time, economic scholars and policy makers performed following the idea on the inverse correlation between the unemployment and inflation (ECB, 2021). However, over time, there has been much speculation on the validity of this relationship. According to some, the trade-off between the two was only a result of the environment in the 1960s (post-war recovery period in Europe) characterized with intensive price growth and high employment driven with strong economic growth, resulting in an accidental dependence of the inflation on unemployment. With a change of the economic conditions in 1970s, being induced mostly with the oil crisis, changes in the labor market structure, increase in labor productivity and technological changes, there have occurred a number of doubts pointed at the proper functioning of the trade-off between the employment and inflation, particularly from the long-run perspective. This view was grounded on the findings of Milton Fridman (Fridman, 1968; Fridman, 1977) who first pointed out that in the long run, the Philips curve is vertical, i.e. there is no dependence of unemployment on inflation and monetary policy measures. Hence, a positive relation between these parameters may be found because of the distorting impact of the inflation tax. Accordingly, this has become a dominant stand of the economists in the following discussions on the above linkage. Furthermore, the potential of refining the inflation rate with an influence on the demand was afterwards questioned in the short-run (Atkeson & Ohanian, 2001).

The inquiry about the relationship between the unemployment and economic growth was not left behind in this discourse. The linkage was first determined by Okun (1962) who argued that there is an inverse correlation between the two variables such as for any decrease in the GDP in comparison to potential gross national product, there will be an increase of unemployment for 1%. Accordingly, any time growth rate of real product lags behind the growth rate of potential product, one may expect the decline in unemployment rate in defined extent. Ever since the Okun's law was introduced into economic theory, its validity has become a subject of a wide range of empirical assessments, many of which have confirmed its application in practice. Its assessment has allowed identifying the costs of unemployment in terms of output, thus allowing the policy makers a forecast to reveal which annual GDP rate will not result in creating unemployment (Ball et al., 2013).

Despite the fact that the validity of the Okun's law has been confirmed by a number of empirical studies, its application in practice has been also subject to deviations regarding the identified strength of the inverse relationship (magnitude of the coefficient) which is sensitive to methodological approaches of assessment, a sample, a time period and the stage of the economic cycle considered, thus being different in expansion and recession periods. These deviations were also captured in

the Euro Area in the time frame 2002-2014 when the unemployment was found to be unusually high, except for the period before the Great Recession (2007-2009), while after 2014 it was specifically low given the GDP growth rates. In this view, assessing the relationship between the unemployment and output growth rates is particularly relevant, having in mind that over the last decades, European Union (EU) countries have witnessed the income convergence (particularly EU-15) and the fact that the Great Recession had an impact on the EU labor market implying devastating repercussions on unemployment in the following decade (Eurostat, 2016). In line with that, the employment was one of the macroeconomic variables expected to be hit the most during the COVID crisis. Accordingly, the unemployment rate has been foreseen to rise from 6,9% in 2019 to 9% in 2020 (OECD, 2019). Similarly, in line with Okun's law, the EU GDP has been predicted to record a declining trend at the rate of 7,5%. Such unemployment and growth rates were however only foreseen under the assumption that the EU countries would abolish their measures and lockdowns in the short run. Such a forecast has been upgraded with the release of more varying estimates of the output fall at 15,5% rate in 2020 assuming the continuation of the lockdowns and additional 10% of the GDP decline with another COVID wave (EU Commission, 2020). Accordingly, policy makers' incentives to decrease unemployment and revitalize the convergence have been a core stone of their macroeconomic policies (Cuaresma, 2003).

Despite that fact that there has been a number of researches done to assess the relationship among the above addressed parameters and theoretical postulates, still, their connectivity in terms of the direction and the strength of their linkages remains a subject of discussion among the scholars and economic policy makers, particularly with new global challenges. Accordingly, this study aims to evaluate the interdependence between the inflation, unemployment and economic growth through an empirical assessment of the validity of trade-off between inflation and unemployment and the Okun's law for the sample of Western Balkan (WB) countries and the European Union as a whole, measuring also a contribution of unemployment and inflation to GDP growth in the observed period. The findings of this study may be highly relevant to policy makers for determining the appropriate macroeconomic policy stance and understanding the corresponding sacrifice ratio, i.e. the cost reflected in an increase in unemployment for cutting down the inflationary pressures.

2. Literature review

The relationship between the unemployment, inflation and economic growth has been examined by a number of scholars, labor economists, analysts and policy makers aiming to more profoundly understand the nature of these variables connections in addressing various economic issues occurring in economies around the world. Accordingly, their linkages have been empirically assessed by a wide range of researchers arriving periodically at mixed results.

Aiming to reveal if a higher inflation results in new jobs creation, Vermeulen (2015) used Engle-Granger error correction approach in South Africa confirming the negative correlation between the two variables. The results of this study also pointed out the existence of the positive relationship between the employment and output in the long term. Differently, the adequacy of the anticipated trade-off in determining the causality between the unemployment and inflation was not confirmed by Qin & Wang (2013) who examined this relationship in China. The authors justified their findings indicating that this concept is ineffective for the complexed economy in a communist country. In this view inefficiency of the Philips curve was as well pointed out by Umoru & Anyiwe (2013) who applied vector correction technique in examining its validity in Nigeria over the long run. Their findings have revealed the existence of stagflation instead. Similarly, having an assessment of the connection between inflation and unemployment, Umaru & Zubairu (2012) in Nigeria resulted with identified damaging consequence of inflation on unemployment, whereas no causal relationship was confirmed by the authors. Their findings nevertheless distinguished the importance of such linkages in the long run. With an intention to test the applicability of the original Philips curve to Nigerian economy, Orji et al. (2015) identified unemployment as one of the main determinants of the inflation, while pointing out the existence of positive correlation between the inflation and unemployment rate. Being interested in revealing the impact of unemployment and inflation on output level in Nigeria, Umaru et al. (2013) have applied Granger causality test which resulted with findings according to which the first two have proven to be causal for the real GDP, while the last was not determined as factitive for the unemployment and inflation in the short run. Still, their findings pointed out that a decline in inflation and unemployment are supporting factor for the economic growth, confirming their relationship in the long run. With an intent to investigate the determinants of unemployment in BRIC countries (Brazil, Russia, India and China), Gur's (2015) have identified inflation and population increase as its main drivers, while GDP and industrial output growth were evidenced to be the main factors affecting the unemployment rate. Similarly, while assessing the causality among the above variables in Sri Lanka, Thayaparan (2014) has confirmed the meaningful impact of inflation on decrease in unemployment and positive contributing effect of GDP on unemployment. Thus, the author has revealed the existence of one-way direction causal relationship between inflation and unemployment and the two-way direction causality between GDP and unemployment and between GDP and inflation. In this view, having an assessment of the linkages between the three variables in Philippines, Resurreccion (2014) has provided evidence supporting the validity of both, Philips curve and Okun's law for the examined period. Such an assessment by Furuoka & Munir (2014) done for Malaysia case resulted with findings according to which the Philips curve was proved to be an effective tool to explain the economic dynamics in this country in both, short and the long run.

Even though the Okun's law was derived based on the study by which (Okun, 1962) examined this relationship for the US economy, there has been a number of studies in macroeconomics that tested this law using time series data for a number of countries worldwide (Attfield and Silverstone 1997, Freeman 2001, Izyumov and Vahaly 2002, Christopoulos 2004, Adanu 2005, Huang and Lin 2008, Villaverde and Maza 2009, Ceylan and Sahin 2010, Tatoglu 2011, Dogru 2013, Elshamy 2013).

A number of such analysis has been performed for a range of selected Asian economies with an attempt to assess the efficiency of Okun's law and its functioning in practice. Accordingly, while the findings of these studies have for most of the examined countries proven the existence of the negative correlation between unemployment and GDP growth, they have provided mixed results in terms of the strength of such relationship and the value of the Okun's ratio (Javeid, 2010; Misbah et al., 2014; Lal et al.; 2010;). Still, a reverse Okun's law has been identified in agriculture. Similarly, according to the results of the study conducted by Apergis and Reztis (2003) who estimated the Okun's coefficient for the Greek economy, the examined relationship between the unemployment and growth has been characterized by a structural variations and unemployment being less responsive in the second half of the assessed period. Zagler (2003) whose study examined the Okun's law Applying VECM to panel data for France, Germany, Italy and the UK economy, suggests that there is a co-integration and positive relationship existing between the unemployment and growth in the long run. According to the study of Saget (2003), which investigated this relationship in 11 European countries, the economic growth was found to be closely related with unemployment decline in three countries (Poland, Hungary and Slovenia), whereas linkages in the changes of the two variables were observed of lower strength for Russia, Slovakia and Baltic countries. In case of Bulgaria, Romania and Ukraine the results suggested no statistical significance of the relationship.

The existence of the negative relationship between the economic growth and unemployment was also identified by a number of authors in OECD countries (Schmid & Onaran, 2008; Fouquau, 2012; Kargi, 2013; Snieska et al., 2020; Zanin, 2014; Moazzami & Dadgostar, 2011). Still, the findings have pointed out the asymmetry in the relationship between cyclical unemployment and the output gap. However, the coefficient was significant only for several sample countries. In the study conducted by Dritsaki and Dritsakis (2009) and Villaverde and Maza (2009) the Okun's coefficient for the Mediterranean countries confirms the inverse relationship between the growth and unemployment. Nevertheless, the coefficient is found to be of different value across the countries and different regions country-wide thus suggesting different strength of the relationship. In addition, the results have indicated that, given the differences in the age and gender, the youngest generations are found to be the most vulnerable to the economic cycle. According to Silvapulle et al. (2004) the validity of the Okun's law is characterized by its asymmetry where there is a difference in the strength of the relationship between the two variables

given the stage in the progress on the economic cycle path. As suggested by Viren (2001), this could be highly relevant for the Eurozone countries since they could be at different stages of their economy business cycle. In this view, Novak & Darmo (2019) who examined this relationship for EU 28 pointed out that the Okun's coefficient was higher in the aftermath of the crisis compared to the period before the crisis. Similar stand has been confirmed for the US economy by several authors (Quade, 2003; Ball et al., 2013; Owayang & Sekhposyan, 2012; Valadkahi & Smyth, 2015, Canarella & Miller, 2016). Their findings also suggest that the strength of such a relationship is found to be greater during and in the recession compared to expansion periods. Having addressed the functioning of the Okun's law in the range of countries, Economou & Psarinos (2016) have pointed out that the linkages between the unemployment and economic prosperity are found to be of less importance in the countries with strong labor market regulation and low market flexibility (e.g. social job protections, strengthening labor unions, greater formal restrictions on employee release. Accordingly, one may expect that such a relationship will be of less strength in the Eurozone countries comparing to the United States. Hence, the authors assessed the Okun's law in sample of 13 EU countries indicating that the labor market protection extent is in inverse relationship with the Okun's ratio and impact of unemployment decrease on growth of output. Mielcova (2011) that investigated the applicability of the Okun's law in Czech Republic, revealed that while the transition countries may be faced with challenges to reduce the unemployment due to meaningful elasticity of the linkages between the unemployment and GDP, developed countries, such as France or US could achieve it easily due to inelastic relationship of the two parameters and policies aimed at economic growth promotion. The asymmetry in Okun's law was as well confirmed by Caraianni (2012) for the Romanian economy and by Karfakis (2014) for the Greece case. The authors point out that such asymmetric behavior is mostly driven by the different economic cycle stages (with higher Okun's coefficient during the recession compared to expansion periods) and observed country regime. In line with these findings, recent studies have also confirmed the asymmetric behavior of GDP growth and unemployment (Beknazarov et al., 2020, Vigliarolo, 2020, Bilan et al. 2020; Mishchuk et al., 2020, Soylu et al.; 2018).

Despite the fact that numerous studies that have validated the existence of inverse relationship between the unemployment and economic growth, there have been also found the empirical evidence that tends to reject the Okun's law (Vistrand, 2006, Sadiku et al. 2015, Prorok, 2015). These results suggesting a simultaneous decline in GDP and rise in the labor productivity were mostly particular for the period of recession and occurred in US, Spain and Ireland, while in some cases the positive relationship between the two variables was identified in both, short and long run which may be explained by the complexity of the market and country regime.

Encompassing previously said, the evidence on the relationship between unemployment and growth is found to be somewhat mixed. Even though, the

empirical results of many authors have confirmed the postulate of the inverse association between the two variables, this relationship was also found to vary across different time periods and business cycles. This could be attributed to the fact that Okun's coefficient is also determined by other production factors and working conditions in a country. Therefore, one needs to monitor the dynamics of those macroeconomic indicators more closely over the long run and within the framework for selected country before making concluding remarks. Ambiguously, the Okun's law has been confirmed as a very useful forecasting tool.

3. Methodology and research results

The study aims to evaluate the interdependence between inflation, unemployment and economic growth for the Western Balkan (WB) countries and the European Union as a whole, given the intention of the WB countries to enter the EU. The research covers, based on the data available on the *World Bank* platforms, the time period from 2006 to 2021. Following the research data, the authors strive to determine changes of these two macroeconomic indicators in order to assess the validity of the anticipated trade-off between inflation and unemployment and applicability of the Okun's law for the examined period. Aiming to explore these linkages, the subject of the analysis are Serbia, Bosnia and Hercegovina, Montenegro, North Macedonia, Albania and the EU. In addition to testing the Okun's law and trade-off between the inflation and unemployment, the regression analysis is performed to assess the link between inflation, unemployment and GDP growth and measure the mutual contribution of the independent variables (unemployment and inflation) to economic expansion (measured with GDP growth) of the selected countries.

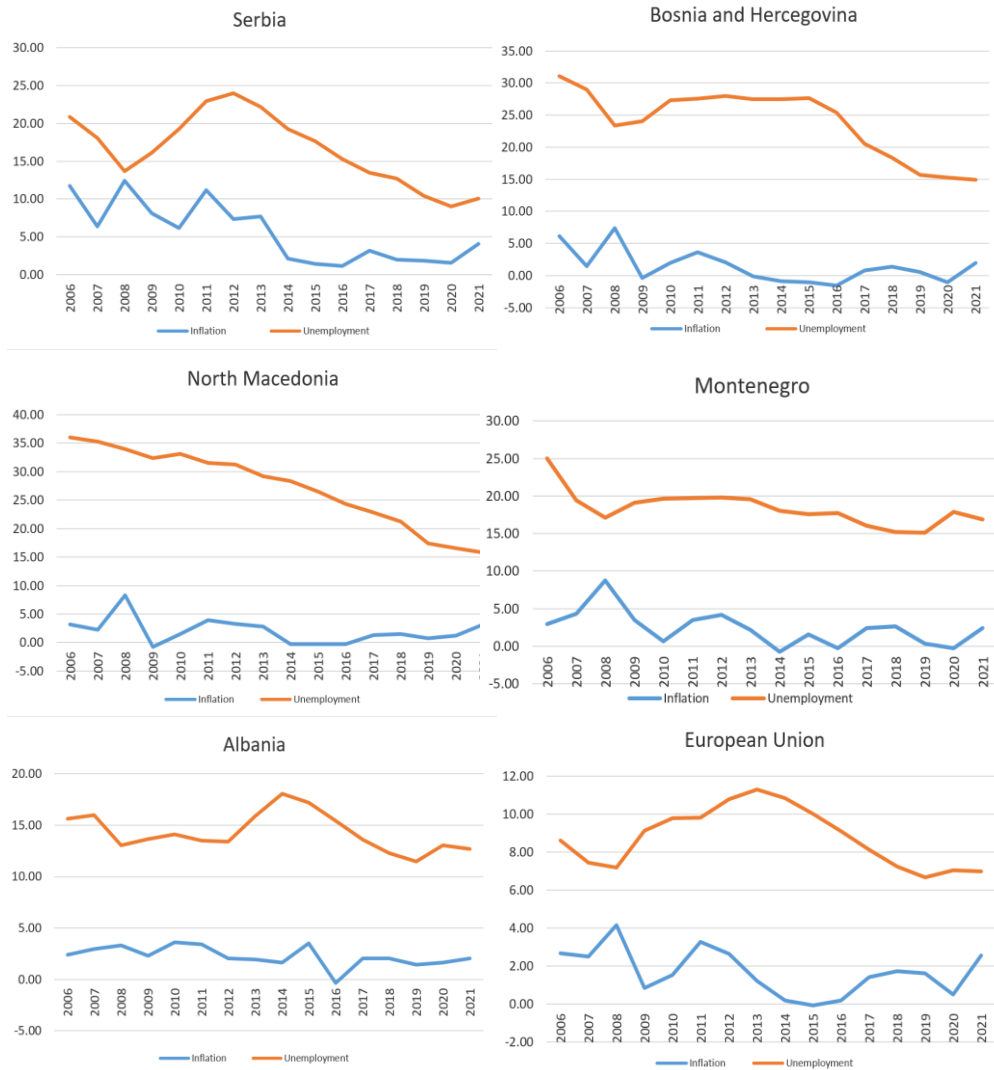
Considering the determined research goal, the article addresses the following research questions:

1. Given a trade-off between inflation and unemployment, can all Western Balkan countries confirm the reverse relationship in the analyzed period?
2. At which extent the Okun's law is applicable for the analyzed Western Balkan countries and the EU?
3. Is the contribution of inflation and unemployment to the economic performance of a country (measured by GDP growth rate) in the same direction and size for the all analyzed Western Balkan countries?

In order to examine a relationship between inflation and unemployment and test its type and nature, the illustrations below graphically present historical data of these two indicators for the Western Balkan countries and the EU. Starting from the assumption that there is a trade-off between inflation and unemployment and the Phillip curve, as a graphical representation of this trade-off is not a universal

phenomenon being a subject to change due to a whole range of factors, the research data simple show trend of inflation and unemployment over the sixteen years period.

Figure 1. Inflation and unemployment of the Western Balkan countries and EU for the period 2006-2021



Source: Prepared by authors based on the World Bank statistics

Based on the figure 1, the reverse relationship between inflation and unemployment, being observed as a trend for the whole analyzed period, can be stated for Serbia, B&H, Montenegro, Albania and the EU. North Macedonia, with its constant drop in unemployment from 36% in 2006 to 16% in 2021 and

fluctuations only in inflation, can hardly confirm this kind of relationship. Although the counties show a diverse magnitude, range and volatility of these two indicators, the common for all of them is decrease of unemployment and rise of inflation in 2008, as a response to the financial crises. The different movement in other years occurs due to the various factors, such as the state of the economy, its stability and flexibility, extent and volatility of unemployment and inflation, preferences and efficiency of monetary and fiscal policy, etc. For instance, in 2020 as the year affected by COVID-19 and socio-economic crises, the observed countries reacted in a dissimilar way when it comes to inflation and unemployment. Namely, only Montenegro among WB countries in this year recorded trade-off (by lowering inflation and increasing unemployment). On the other hand, Serbia, North Macedonia and B&H lowered both indicators, while Albania slightly increased.

Table 1 provides information on comparative changes between GDP and unemployment of the Western Balkans and EU, for the period 2006-2021. Aiming to test the Okun's law, annual changes have been calculated for both unemployment and GDP.

Table 1. Changes in unemployment and GDP from 2006 to 2021 for the Western Balkans and EU

	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	2019/ 2020	2020/ 2021	
Unemployment	SRB	-2,79	4,36	2,44	3,08	3,75	1,03	-1,85	-2,93	-1,56	-2,40	-1,78	-0,75	-2,34	1,38	1,05
	BIH	-2,13	-5,57	0,66	3,24	0,27	0,43	-0,52	0,03	0,17	-2,28	-4,88	-2,13	-2,71	0,42	-0,37
	MKD	-0,80	1,30	-1,58	0,78	-1,63	-0,30	-2,06	-0,76	-1,95	-2,13	-1,49	-1,61	-3,81	0,84	-0,77
	MNE	-5,57	-2,25	1,94	0,56	0,11	0,05	-0,22	-1,54	-0,50	0,18	-1,65	-0,89	-0,06	2,75	-1,01
	ALB	0,34	-2,91	0,61	0,42	-0,61	-0,10	2,49	2,18	-0,86	-1,77	-1,80	-1,32	-0,83	1,60	-0,38
	EU	-1,18	-0,25	1,92	0,67	0,04	0,97	0,52	-0,48	-0,82	-0,91	-0,98	-0,87	-0,57	0,38	-0,05
GDP	SRB	1,33	0,78	-8,39	3,46	1,31	-2,72	3,57	-4,48	3,40	1,53	-1,24	2,39	-0,16	5,23	8,45
	BIH	0,44	0,41	-8,45	3,87	0,09	-1,78	3,17	-1,20	1,94	0,06	0,02	0,57	-0,91	5,95	10,66
	MKD	1,34	1,00	-5,83	3,72	-1,02	-2,80	3,38	0,70	0,23	-1,01	-1,77	1,80	1,03	0,02	10,08
	MNE	-1,76	0,41	13,02	8,53	0,49	-5,95	6,27	-1,77	1,61	-0,44	1,77	0,36	-1,01	9,37	27,74
	ALB	0,08	1,52	-4,15	0,35	-1,16	-1,13	-0,42	0,77	0,44	1,10	0,49	0,22	-1,93	5,57	12,00
	EU	-0,34	-2,52	-4,99	6,57	-0,33	-2,59	0,62	1,68	0,71	-0,33	0,86	-0,77	-0,26	7,48	11,07
Note:		Changes in inflation and unemployment in an opposite direction (Okun's law)														
		Changes in inflation and unemployment in the same direction														

Source: Authors' calculation

Considering that Okun's law predicts 2% decrease in GDP for any percent rise in unemployment and vice versa, the results in green in table 1 confirm this statement, while results in red disprove. For instance, in 2009/2010 (except for North

Macedonia) and 2014/2015 (except for B&H) all countries confirm the Okun's law. On the other hand, in 2010 compared to 2009 in all analysed countries are noticed positive changes in both unemployment and GDP which is contrary to the Okun's law. Based on table 1, 56% results are in line with the Okun's law statement (green), and the rest (44%) indicate the possibility for unemployment and GDP to change in the same direction.

With the aim to evaluate the relationship between inflation and unemployment, and at the same time GDP growth, the regression analysis has been done based on the standard model. As an often used statistical and analytical tool, the regression analysis strives to determine a relationship between a dependent variable (in this research GDP growth) and independent variables (inflation and unemployment), both measured on the same scale. Governing the strength of impact that independent variables have, the regression analysis provides deeper understanding of contribution that inflation and unemployment have to the overall economy and its development (via GDP growth). Tables 2 and 3 provides the results of conducted regression analysis.

Table 2. Regression analysis results for the Western Balkan countries and EU

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.425 ^a	.180	.054	2.92571	.180	1.429	2	13	.275	2.047
2	.452 ^a	.204	.082	2.88983	.204	1.666	2	13	.227	1.685
3	.422 ^a	.178	.052	2.89988	.178	1.411	2	13	.279	2.387
4	.311 ^a	.097	-.042	6.49191	.097	.694	2	13	.517	2.405
5	.271 ^a	.073	-.069	2.92533	.073	.514	2	13	.610	1.801
6	.286 ^a	.082	-.059	2.88295	.082	.579	2	13	.574	1.995

1. Serbia: a. Predictors: (Constant), Inflation, Unemployment
 2. Bosnia and Hercegovina: a. Predictors: (Constant), Inflation, Unemployment
 3. North Macedonia: a. Predictors: (Constant), Inflation, Unemployment
 4. Montenegro: a. Predictors: (Constant), Inflation, Unemployment
 5. Albania: a. Predictors: (Constant), Inflation, Unemployment
 6. European Union: a. Predictors: (Constant), Inflation, Unemployment
- Note: Dependent variable for all analyzed countries is gross domestic product (GDP) growth (annual %)

Source: Authors' calculation

The research results from table 2 (multiple correlation coefficient R) confirm the existence of a linear correlation between predictors (inflation and unemployment) and GDP growth as a dependent variable. Slightly higher values for Serbia, B&H and North Macedonia suggest more intense impact that inflation and unemployment have to the GDP growth for these countries.

Table 3. Regression analysis – coefficients

Model	Unstandardized Coefficients		Std. Coeff.	t.	Sig.	Correlations			Collinearity Statistics	
	B	Std. Err.	Beta			Zero-order	Partial	Part	Tolerance	VIF
1. (Constant)	5.820	2.770		2.101	.056					
Inflation	0.298	0.226	0.389	1.322	.209	.145	.344	.332	.728	1.373
Unemploym.	-0.297	0.187	-0.467	-0.589	.136	-.265	-.403	-.399	.728	1.373
2. (Constant)	2.926	3.438		0.851	.410					
Inflation	0.545	0.299	0.461	1.825	.091	.442	.452	.452	.958	1.044
Unemploym.	-0.053	0.143	-0.094	-0.374	.071	.000	-.103	-.092	.958	1.044
3. (Constant)	-1.893	3.096		-0.612	.055					
Inflation	0.229	0.352	0.172	0.650	.027	.277	.178	.164	.902	1.109
Unemploym.	0.147	0.116	-0.335	1.267	.227	.389	.332	.319	.902	1.109
4. (Constant)	2.080	13.167		0.158	.077					
Inflation	0.853	0.724	0.313	1.178	.260	.309	.310	.310	.983	1.017
Unemploym.	-0.078	0.717	-0.029	-0.109	.015	.011	-.030	-.029	.983	1.017
5. (Constant)	3.571	6.108		0.585	.569					
Inflation	0.732	0.753	0.260	0.973	.348	.257	.260	.260	.999	1.001
Unemploym.	-0.130	0.411	-0.084	-0.316	.057	-.077	-.087	-.084	.999	1.001
6. (Constant)	0.253	4.858		0.052	.059					
Inflation	0.653	0.642	0.282	1.017	.328	.286	.271	.270	.917	1.090
Unemploym.	-0.022	0.500	-0.012	-0.044	.065	-.094	-.012	-.012	.917	1.090

1. Serbia: a. Predictors: (Constant), Inflation, Unemployment
2. Bosnia and Hercegovina: a. Predictors: (Constant), Inflation, Unemployment
3. North Macedonia: a. Predictors: (Constant), Inflation, Unemployment
4. Montenegro: a. Predictors: (Constant), Inflation, Unemployment
5. Albania: a. Predictors: (Constant), Inflation, Unemployment
6. European Union: a. Predictors: (Constant), Inflation, Unemployment

Note: Dependent variable for all analyzed countries is gross domestic product (GDP) growth (annual %)

Source: Authors' calculation

Following the previously confirmed linear correlation, a direction and size of contribution of inflation and unemployment have also been explored. The results of β coefficient in table 3 show, for all countries, a positive impact that inflation has to the economic performance of the analyzed countries, while unemployment records negative impact. Namely, based on the regression analysis can be concluded that rise of inflation and drop in unemployment positively contribute to the countries' GDP growth. Further, this contribution can be quantified considering that β coefficient also shows the number of unit change in GDP growth for one unit change in independent variables. Thus, one point rise in GDP growth in Serbia corresponds to increase of 0.389 inflation rate in Serbia. The same elaboration can be applied to the rest of results.

4. Conclusion

This study aimed to evaluate the interdependence between inflation, unemployment and economic growth through empirical assessment of the validity of the trade-off between the first two and the accuracy of the Okun's law for the sample of Western Balkan (WB) countries and the European Union as a whole. For this purpose, the panel data available on the *World Bank* platforms for the time period from 2006 to 2021 were used.

According to the data plotted, the reverse relationship between inflation and unemployment, was observed as a trend for the whole analyzed period, for Serbia, B&H, Montenegro, Albania and the EU. Differently, North Macedonia, with its constant drop in unemployment and fluctuations only in inflation, can hardly confirm this kind of relationship. Although the counties show a diverse magnitude, range and volatility of these two indicators movement, the common for all of them is decrease of unemployment and rise of inflation in 2008, as a response to the financial crises. The different movement in other years occurs due to the various factors, such as the state of the economy, its stability and flexibility, extent and volatility of unemployment and inflation, preferences and efficiency of monetary and fiscal policy, etc.

Considering that Okun's law, while some results confirm the validity of this law, other disprove it. For instance, in 2009/2010 (except for North Macedonia) and 2014/2015 (except for B&H) all countries confirm the Okun's law. On the other hand, in 2010 compared to 2009 in all analysed countries are noticed positive changes in both unemployment and GDP which is contrary to the Okun's law.

With the aim to assess the contribution of unemployment and inflation to GDP growth, the regression analysis was performed based on the standard model. The results of β coefficient for all countries show a positive impact of inflation on the economic performance of the analyzed countries, while unemployment records negative impact. Namely, based on the regression analysis can be concluded that rise of inflation and drop in unemployment positively contribute to the countries' GDP growth. This contribution is quantified based on the β coefficient value which shows the number of unit change in GDP growth for one unit change in independent variables. Accordingly, one-point rise in GDP growth in Serbia corresponds to increase of 0.389 inflation rate. The same elaboration can be applied to the rest of results.

References

- Adanu, K. (2005). A Cross-Province Comparison of Okun's Coefficient for Canada Applied Economics, 37, 561-570.
- Attfield, C. and Silverstone B. (1997). Okun's Coefficient: A comment, The Review of Economics and Statistics, 79, 326-329.
- Atkeson, A., and Ohanian, L.E.(2001). Are Phillips Curves Useful for Forecasting Inflation?. Quarterly Review, Federal Reserve Bank of Minneapolis, 25, 2-11.
- Apergis N. and Rezitis A. (2003). An Examination of Okun's Law: Evidence From Regional Areas in Greece, Applied Economics, 35(10), 1147-1151.
- Beknazarov, B., Niyazbekova, R., Amirseitov, U., Kokenova, A., Daurbayeva, M., Aitkazina, M. (2020). Development of Entrepreneurship and Forms of Self-Employment in the Innovative sectors of the Economy“, Entrepreneurship and Sustainability Issues, 8(2), 10-229.
- Bilan, Y., Mishchuk, H., Samoliuk, N., Yurchyk, H. (2020). Impact of Income Distribution on Social and Economic Well-Being of the State, Sustainability, 12(1), 429.
- Ball, L., Leigh, D., Loungani, P. (2013). Okun's Law: Fit at 50?, IMF Working Paper, No. 13/10, 1-39.
- Caraiani, P. (2012). Asymmetry in the Okun Coefficient in Romanian Economy, *Ekonomie a Management*, 15(4), 49-55.
- Canarella, G., and Miller, M. S. (2017). Inflation Targeting: New Evidence from Fractional Integration and Cointegration (August 19, 2016). *Journal of Economics and Business*, availableonlineatSSRN: <https://ssrn.com/abstract=2826793> or <http://dx.doi.org/10.2139/ssrn.2826793>
- Cuaresma, J. C. (2003). Okun's law revisited. *Oxford Bulletin of Economics and Statistics*, 65(4), 439-451.
- Christopoulos, (2004). The Relationship Between Output and Unemployment: Evidence from Greek Regions, *Regional Science*, 83, 611-620.
- Ceylan, S. and Sahin, B. Y. (2010). Asymmetry in the Relationship Between Unemployment and Economic Growth. *The Journal of Dogus University*, 11(2), 157-165.
- Dogru, B. (2013). The Link Between Unemployment Rate and Real Output in Eurozone: A panel Error Correction Approach, *Procedia: Social and Behavioral Sciences*, 99, 94-103.
- Dritsaki C. and Dritsakis N. (2009). Okun's Coefficient for Four Mediterranean Member Countries of EU: An Empirical Study University of Macedonia, *International Journal of Business and Management*, 4(5), availableonlineat:<https://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=5A69613B6F6E44316CBD31C3F34D1947?doi=10.1.1.687.7887&rep=rep1&type=pdf>
- Elshamy, H. (2013). The Relationship Between Unemployment and Output in Egypt. *Procedia: Social and Behavioral Sciences*, 81, 22-26.
- Economou, A., & Psarianos, I. N. (2016). Revisiting Okun's Law in European Union countries. *Journal of Economic Studies*, 43(2), 275-287.
- EU Commission, Spring 2020 Economic Forecast
- ECB. (2021). Employment and the Conduct of Monetary Policy in the Euro Area. *ECB Occasional Paper Series*, 275, 1-149.
- Eurostat (2016). <http://ec.europa.eu/eurostat/data/database>.
- Freeman, D.G. (2001). Regional Test for Okun's Law, *Int'l Advances in Economic Research*, 6(3), 557-570.

- Friedman, M. (1977). Nobel Lecture: Inflation and Unemployment. *Journal of Political Economy*, 85, 451-472.
- Furuoka F, Munir Q. (2014). Unemployment and Inflation in Malaysia: Evidence from Error Correction Model. *Malaysian Journal of Business and Economics*, 1(1), 35-45.
- Fouquau, J. (2008). Threshold Effects in Okun's Law: A Panel Data Analysis. *Economics Bulletin*, 5(33), 1-14.
- Friedman, M. (1968). The Role of Monetary Policy. *American Economic Review*, 58, 1-17.
- Gur B. (2015). An Analysis of Unemployment Determinants in BRIC Countries. *International Journal of Business and Social Science International Journal of Business and Social Science*, 6(1), 192-198.
- Huang, H. C. and Lin, S. C., (2009). Non-Linear Finance–Growth Nexus. *Economics of Transition* 17, 439–466.
- Hronova, S., Lobos, M., Hindls, R. (2021). Convergence of Inflation and Unemployment Rates: a Signal of Economic Slowdown?. *Statistics & Economy Journal*, 101(3), 244-258.
- Izyumov, A. and Vahaly, J. (2002). The Unemployment-Output Trade-off in Transition Economies: Does Okun's Law Apply?, *Economics of Planning*, 35, 317-331.
- Jeke L, Wanjuu L. Z. (2021). The Economic Impact of Unemployment and Inflation on Output Growth in South Africa. *Journal of Economics and International Finance*, 13(3), 117-126.
- Javeid U. (2010). Validity of Okun's law – Empirical Evidence from Pakistan, available online at: <https://www.divaportal.org/smash/get/diva2:525872/FULLTEXT01>
- Kargi, B. (2013). Okun's Law and Long Term Co-Integration Analysis for OECD Countries (1987-2012). *International Research Journal of Finance and Economics*, 119, 77-85.
- Karfakis, C., Katrakilidis, C., Tsanana, E. (2014). Does Output Predict Unemployment? A Look at Okun's Law in Greece. *International Labor Review*, 153(3), 421-433.
- Lal, S., Jalil, A., Hussain, A., (2010). Test of Okun's Law in Some Asian Countries: Co-Integration Approach. *European Journal of Scientific Research*, 40(1), 73–80.
- Mishchuk, H., Bilan, S., Yurchyk, H., Akimova, L., Navickas, M. (2020). Impact of the Shadow Economy on Social Safety: The Experience of Ukraine. *Economics and Sociology*, 13(2), 284- 298.
- Misbah, A., Shahzad, H., Hasan, R. (2014). An Empirical Estimation of Okun's Law in Context of Pakistan. *Developing Country Studies*, 4(14), 136-142.
- Mielcova, E. (2011). Economic Growth and Unemployment Rate of the Transition Country – The Case of the Czech Republic (1996-2009). *Ekonomie a Management*, 14(1), 29-37.
- Moazzami, B., Dadgostar, B. (2011). Okun's Law Revisited: Evidence from OECD Countries. *International Business & Economics Research Journal (IBER)*, 8(8):21-24.
- Novak, M., and Darmo, L. (2019). Okun's Law Over the Business Cycle: Does it Change in the EU Countries After the Financial Crisis?. *Prague Economic Papers, Prague University of Economics and Business*, 2019(2), 235-254.
- Orji, A., Orji, O., Okafor, J.C. (2015). Inflation and Unemployment Nexus in Nigeria: Another Test of The Phillip's S Curve Contribution. *Asian Economic and Financial Review*, 5(5), 766-778.
- Okun, A. M. (1962). Potential GNP: Its Measurement and Significance. *Proceedings, Business and Economic Statistics Section of the American Statistical Association*, 89 – 104.
- OECD Statistics (2019). <http://stats.oecd.org/>.
- Owyang M., and Sekhposyan T. (2012). Okun's Law Over the Business Cycle: Was the Great Recession all that Different?. *Review, Federal Reserve Bank of St. Louis*, 94(5), 399-418.

- Qin, F. and Wang, Q. (2013). The Research on Inflation Rate and Unemployment Rate in China. Proceeding of the International Conference on Social Science Research, ICSSR, 202-220.
- Quade, F. F. S. (2003). An Empirical Analysis of the Relationship Between GDP and Unemployment. *Humanomics*, 9(3), 1-6.
- Prorok, V. (2015). The Empirical Analysis of Okun's Law on the Macedonian Market, Synthesis International Scientific Conference of IT and Business-Related Research Book of Proceedings, 427-431.
- Philips, A.W. (1958). The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957. *Economica*, 25(100), 283-299.
- Resurreccion, P.F. (2014). Linking Unemployment to Inflation and Economic Growth: Toward a Better Understanding of Unemployment in The Philippines. *Asian Journal of Economic Modelling*, 2(4), 156-168.
- Saget, C. (2000). Can the Level of Employment be Explained by GDP Growth in Transition Countries? (Theory versus the Quality of Data), *Labour*, 14(4), 623-643.
- Sadikua M., Ibrahim A., and Sadikuc L. (2015). Econometric Estimation of the Relationship Between Unemployment Rate and Economic Growth of FYR of Macedonia, *Procedia Economics and Finance* 19, 69 – 81.
- Soylu, O.B., Çakmak, I., Okur, F. (2018). Economic Growth and Unemployment Issue: Panel Data Analysis in Eastern European Countries. *Journal of International Studies*, 11(1), 93-107.
- Silvapulle, P., Moosa, I. A., and Silvapulle, M. J. (2004). Asymmetry in Okun's Law. *The Canadian Journal of Economics*, 37(2), 353-374.
- Snieska, V., Navickas, V., Grecikova, A., Safrankova, J. M., and Sikyr, M. (2020). Fundamental Human Resource Management Practices Aimed at Dealing with New Challenges in the Labor Market. *Transform. Bus Econ.* 19, 38-51.
- Schmid, G. (2008). Full Employment in Europe: Managing Labor Market Transitions and Risks, Edward Elgar, available online at: https://www.researchgate.net/publication/264003449_Full_Employment_in_Europe_Managing_Labour_Market_Transitions_and_Risks
- Tatoglu, F. (2011). The Long and Short Run Effects Between Unemployment And Economic Growth In Europe *Doğuş University Journal*, 12 (1), 99-113.
- Thayaparan, A. (2014). Impact of Inflation and Economic Growth. *Global Journal of Management and Business Research: B Economics and Commerce*, 13(5), available online at: https://globaljournals.org/GJMBR_Volume14/5-Impact-of-Inflation-and-Economic.pdf
- Umaru, A., Manu, D., Salihu, M. (2013). An Empirical Investigation into the Effect of Unemployment and Inflation on Economic Growth in Nigeria. *Interdisciplinary Journal of Research in Business*, 2(1)-14.
- Umoru, D. and Anyiwe, M. A. (2013). Dynamics of Inflation and Unemployment in a Vector Error Correction Model. *Research on Hum. & Soc. Sci.* 3(3), 20-29.
- Umaru, A. and Zubairu, A.A. (2012). The Effect of Inflation on the Growth and Development of the Nigerian Economy (An Empirical Analysis). *International Journal of Business and Social Science*, 3, 18-19.
- Vermeulen, C. (2015). Inflation, Growth and Employment in South Africa: Trends and Trade-Offs. ERSA Working Paper 547.
- Villaverde, J. and Maza, A. (2009). The Robustness of Okun's Law in Spain, 1980-2004 regional evidence. *Journal of Policy Modeling*, 31(2), 289-297.

- Vistrand, H. (2006). Jobless Growth in Sweden? A Descriptive Study. Being a Master's Thesis in International Economics and Business at Stockholm School of Economics, 1-5.
- Viren, M. (2001). The Okun's Curve is Non Linear. *Economics Letters*, 70, 53-257.
- Vigliarolo, F. (2020). Towards an Ontological Reason Law in Economics: Principles and Foundations. *Insights into Regional Development*, 2(4), 784-801.
- Valadkhani, A. and Smyth, R. (2015). Switching and Asymmetric Behavior of the Okun coefficient in the US: Evidence for the 1948–2015 period. *Economic Modelling*, Elsevier, 50(C), 281-290.
- Zagler, M. (2003). The Dynamics of Economic Growth and Unemployment in Major European Countries: Analysis of Okun's Law. *Applied Econometrics and International Development*, Euro-American Association of Economic Development, 3(3).
- Zanin, L. (2014). On Okun's Law in OECD Countries: An Analysis by Age Cohorts, *Economics Letters*, 125(2), 243-248.

MEĐUZAVISNOST INFLACIJE I NEZAPOSLENOSTI: ISKUSTVA ZEMALJA ZAPADNOG BALKANA

Apstrakt: Diskusija o odnosu između inflacije, nezaposlenosti i privrednog rasta je tokom vekova bila relevantna za širok spektar ekonomskih interesa. Istraživači i ekonomisti se slažu da će postizanje stabilnosti cena, ceteris paribus, imati blagotvoran efekat na zaposlenost i ekonomski prosperitet mereno rastom BDP-a, posebno pod pretpostavkom identifikovanja i održavanja optimalnog praga. Međutim, kako je postizanje idealnog dogovora prilično izazovno za monetarne vlasti, a nezaposlenost i dalje predstavlja jednu od glavnih prepreka širom sveta, posebno za ekonomije u usponu, procena odnosa između ovih varijabli ostaje u fokusu ekonomske publike. Stoga je cilj ove studije da ispita međuzavisnost između inflacije, nezaposlenosti i privrednog rasta kroz empirijsku procenu inverzne veze između prva dva i testiranje validnosti Okunovog zakona za uzorak Zapadnog Balkana (ZB) zemalja i Evropske unije u celini. U tu svrhu korišćeni su panel podaci dostupni na platformama Svetske banke za vremenski period od 2006. do 2021. godine. Pored toga, u cilju procene doprinosa nezaposlenosti i inflacije rastu BDP-a, izvršena je regresiona analiza na osnovu standardnog modela. Nalazi ovog istraživanja potvrđuju kompromis između inflacije i nezaposlenosti za sve ispitane zemlje (Srbija, BiH, Crna Gora, Albanija) i EU, osim za Sjevernu Makedoniju. S druge strane, dobijeni su mešoviti rezultati s obzirom na Okunov zakon. Dok neki rezultati potvrđuju validnost ovog zakona, drugi ga opovrgavaju. Rezultati regresione analize za sve zemlje pokazuju da rast inflacije i pad nezaposlenosti pozitivno doprinose rastu BDP-a zemalja.

Ključne reči: inflacija, nezaposlenost, međuzavisnost, trgovina, Zapadni Balkan, EU

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