

**THE IMPACT OF GROWTH RATE OF GDP ON
UNEMPLOYMENT RATE IN BALKAN COUNTRIES
(ALBANIA, MONTENEGRO, SERBIA AND MACEDONIA)
DURING 2000-2013**

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Abstract

The purpose of this study, referring to the empirical data about real GDP and unemployment for the period 2000-2003 is to assess the relations between GDP and unemployment rate of Western Balkan Countries (Albania, Serbia Montenegro, Bosnia & Herzegovina and Macedonia). The methodology is based on the utility of "Okun's law", focusing on two questions. First, is the Okun's law a reliable, and stable relationship? Second, is the Okun's law a useful forecasting tool? The evidence provided, shows that Okun's relationship between changes in the unemployment rate and output growth, has changed significantly over time. However, "Okun's relationship" still is considered a useful forecasting tool, when the factors that influence

instability of this relationship are taken into consideration. In this article is examined the relationship between unemployment rate and output growth rate, based on the simple version of Okun's law, followed by different versions of Okun's relations, showing how the relationship between unemployment rate and output growth rate have changed over time and explaining for the discrepancies with Okun's law by choosing different versions of Okun's law to achieve the best forecasts.

Keywords: GDP growth (GDP), Unemployment Rate, Okun's Law, Economic Growth

INTRODUCTION

Economic growth, as it is conditioned by many other factors, is as well conditioned by the level of employment. As a result, "human capital" becomes just as important as natural resources or energy for the development of human society. Moreover, in terms of rapid technological innovation, the contribution of human resources, which makes the job factor cross its borders, becoming an important factor for achieving sustainable economic and social developments,

In the current context of economic globalization, (where "new economy" is based on knowledge) human capital, is also called the creative potential of people, considered as a complex system of national wealth. Spiritual side of human capital, intellectual capital, is the main factor that "gives value to the work factor, as an economic value, but above all as a social value.

Most of real income earned by developed countries, especially in recent decades has been due to investment in human capital. Modern societies are increasingly confronted with a phenomenon called, the humane gap, which means a great increase in the complexity of the problems facing humanity, coupled with the impossibility of human ability to be resolving them. The solution is sought in this study is the focus on "social learning", which means that, not only individuals involved in the learning process, but also groups, companies, developing new methodologies, skills, attitudes and values, in order to cope with the dynamic of new global developments.

Thus, the future depends on the growth of human knowledge to act. Knowledge which, in turn, should be integrated into the education system.

In every workplace, today is sought a good education and a high level of training. The ability of employees to develop strategic solutions, to apply knowledge, in view of the dynamics of market development constitutes the main objective of companies.

Overall economic growth is inextricably linked with sustainable economic development and in particular to sustainable human development. Sustainable human development can not be achieved if investment in human resources (human capital) will not be looked priority.

To estimate the contribution to human and economic growth, the study of the law refers to "Okun's" law and his versions to compare these relations with the conclusions of Okun's law. Part of this analysis are included in the study and some of the regional countries, such as Montenegro, Macedonia and Serbia mundsuarot the realization of a comparative analysis of our country / Albania, with other countries in the region.

The study follows with the applications of Okun's Law in Albania and the other countries of region such as Montenegro, Macedonia and Serbia to enable the realization of a comparative analyse between these countries

APPLICATIONS OF OKUN'S LAW IN ALBANIA, MACEDONIA, MONTENEGRO AND SERBIA DURING THE YEARLY PERIOD (2000-2013)

Basic version

The basic version of Okun's Law ", states that between real GDP and unemployment existes a negative correlation. However, in reality, "Okun's Law" is more a statistical relationship that a structural feature of the economy. As in any statistical relationship, the relationship between real GDP and unemployment are subject to revisions when changes occur in the macroeconomy. The basic version of the Okun'slaw , examined the relationship of changes in the unemployment rate to the growth rate of real GDP. So, the basic version of Okun's law mathematically is as follows:

The change in the unemployment rate 'u' = $\alpha + \beta * (\text{growth rate of real output 'g'})$

This shows the relationship between the growth rate of production and changes in the unemployment rate. So this interaction shows the dependence of the unemployment rate to changes in the real growth rate of output. In this relationship " β " is "Okun's coefficient. In these relationship, the Okun's coefficient " β " is expected always to get negative value, meaning that output growth is associated with a declining of unemployment rate, and the decline of output is associated with a higher unemployment rate. But, the report "-a / b" shows the growth rate of output in terms of a stable rate of unemployment, so this shows, how the economy grows for a given level of unemployment /(or static unemployment).

Referring to the data from the second quarter of 1948 and up to the fourth quarter of 1960, a period that coincides with the period obtained in the study, when "Okun", published his original article, founded that mathematically equation was as follows:

Change in unemployment rate = 0.30-0.07 * (Growth rate of real output).

The above result was an example of a regression using data of the period 1948-1960. But it is important that Okun's applications be reviewed based on the changes in the data, in order to reflect changes that occur constantly in the numerical data of these macroeconomic indicators. According to this assessment, in a given period, the zero "0" output growth rate was associated with an increase in the unemployment rate of 0.3 %. The growth rate of production in terms of a sustainable level of unemployment was slightly more than 4 %. The production growth more than this rate coincided with a falling rate of unemployment and lower growth coincided with a rising unemployment rate. The value of Okun's coefficient indicated that every 1 % real output growth over 4 % was associated by a decline of 0.07 % in the unemployment rate.

Results of Applying The Basic Version of Okun's Law For Albania, Macedonia, Montenegro and Serbia During The Period (2000-2013)

In this model are included data series on the growth rate of real GDP and the unemployment rate during the period 2000-2013, as shown in Table 1. Referring unemployment rate are made transformation to perform annual changes in the unemployment rate. The aim of transformation is to fulfill the requirements of the Okun's law. The data being used in the application of the "Okun's law and presented in Table 2 are taken from "The World Bank Site"

Table 1-Real Growth rates of GDP and unemployment by regional countries
from year 2000 to 2013

Albania		Macedonia		Montenegro		Serbia	
Real growth rate of GDP (g)	Unemployment rate (u)	Real growth rate of GDP (g)	Unemployment rate (u)	Real growth rate of GDP (g)	Unemployment rate (u)	Real growth rate of GDP (g)	Unemployment rate (u)
7.30%	13.5%	4.55%	32.2%	3.10%	30.45%	5.34%	12.60%
7.00%	22.7%	-4.53%	30.5%	1.10%	20.40%	5.30%	12.80%
2.90%	13.2%	0.85%	31.9%	1.90%	20.50%	4.12%	13.80%
5.70%	12.7%	2.82%	36.7%	2.50%	20.60%	2.68%	15.20%
5.90%	12.7%	4.63%	37.2%	4.40%	29.30%	9.30%	18.50%
5.50%	12.5%	4.35%	37.3%	4.20%	30.30%	5.40%	20.80%
5.00%	12.4%	5.03%	36.0%	8.60%	24.70%	3.60%	20.80%
5.90%	13.5%	6.15%	34.9%	10.70%	19.40%	5.40%	18.10%
7.70%	13.0%	4.95%	33.8%	6.90%	16.80%	3.80%	13.60%
3.30%	13.8%	-0.92%	32.2%	-5.70%	19.10%	-3.51%	16.60%
3.50%	14.2%	2.90%	32.0%	2.50%	19.70%	1.01%	19.20%
3.00%	14.3%	2.80%	31.4%	3.23%	19.70%	1.57%	19.10%
1.30%	14.7%	-0.40%	31.0%	-2.50%	19.60%	-1.52%	19.60%
1.30%	14.7%	3.10%	31.0%	3.50%	19.60%	2.46%	19.60%

Table 2- Changes in the real growth rate of GDP and in unemployment by regional countries from year 2000-2013

Albania		Macedonia		Montenegro		Serbia	
Ndryshim etnënorm ën e rritjessë GDP- Reale (g)	Ndryshimet nënormënn orma e Papunësisë (u)	Ndryshim etnënorm ën e rritjessë GDP- Reale (g)	Ndryshimet nënormënn orma e Papunësisë (u)	Ndryshime tënormënn e rritjessë GDP-Reale (g)	Ndryshimet nënormënn orma e Papunësisë (u)	Ndryshime tënormënn e rritjessë GDP-Reale (g)	Ndryshimet nënormënn orma e Papunësisë (u)
-0.30%	9.20%	-9.07%	-1.70%	-2.00%	-10.05%	-0.04%	0.20%
-4.10%	-9.50%	5.38%	1.40%	0.80%	0.10%	-1.18%	1.00%
2.80%	-0.50%	1.96%	4.80%	0.60%	0.10%	-1.45%	1.40%
0.20%	-0.05%	1.81%	0.50%	1.90%	8.70%	6.63%	3.30%
-0.40%	-0.15%	-0.28%	0.10%	-0.20%	1.00%	-3.90%	2.30%
-0.50%	-0.10%	0.68%	-1.30%	4.40%	-5.60%	-1.80%	0.00%
0.90%	1.10%	1.12%	-1.10%	2.10%	-5.30%	1.80%	-2.70%
1.80%	-0.50%	-1.20%	-1.10%	-3.80%	-2.60%	-1.60%	-4.50%
-4.40%	0.80%	-5.87%	-1.60%	-12.60%	2.30%	-7.31%	3.00%
0.20%	0.40%	3.82%	-0.20%	8.20%	0.60%	4.51%	2.60%
-0.50%	0.10%	-0.10%	-0.60%	0.73%	0.00%	0.56%	-0.10%
-1.70%	0.40%	-3.20%	-0.40%	-5.73%	-0.10%	-3.09%	0.50%
0.00%	0.00%	3.50%	0.00%	6.00%	0.00%	3.98%	0.00%

Based on the data in Table 2, econometric models are constructed as explained below:

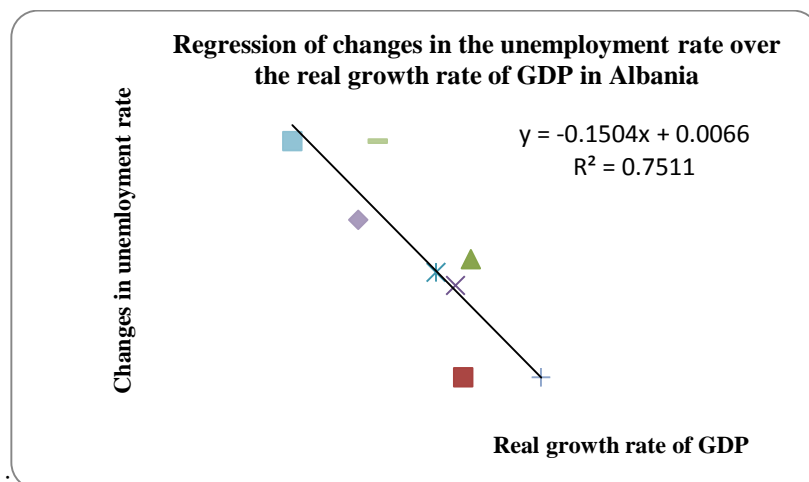
$$u = f(g) + \varepsilon$$

In this equation u - represents the real values of the dependent variable (changes in the unemployment rate), while the variable g - represents the real values of the independent variable (the growth rate of GDP) and ε (random deviations / 'residuals'), describing the effects of other factors not defined, that have an impact on the dependent variable u . In this case, applying the model of simple linear regression, by regressing changes of the unemployment rate to the real growth rate of GDP, analytical and graphical results for the countries included in this study are as follows:

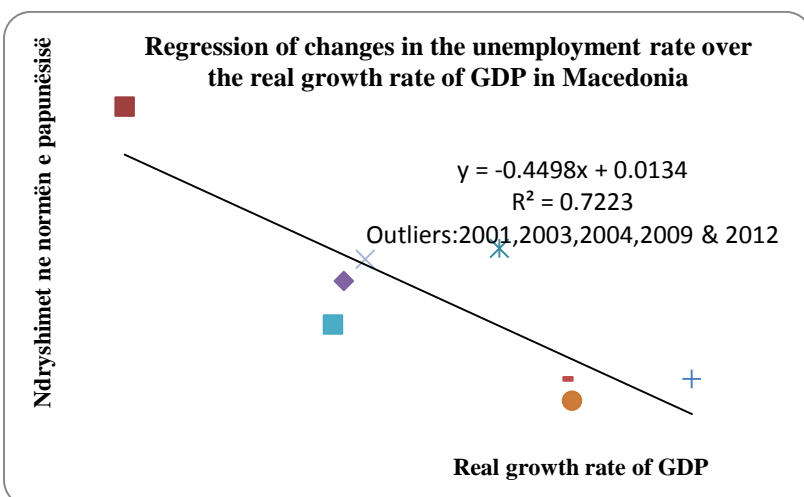
Table 3: Results of regressing the changes of the unemployment rate over the real economic growth rate g

countries	The model	Parameters		(R) ²	Per U=0 g=-α/β
		α	β		
Albania	u=0.0066 - 0.1504g	0.0066	-0.1504	75.11%	4.39%
Macedonia	u=0.013 - 0.45g	0.013	-0.45	72.23%	2.89%
Montenegro	u=0.0063 - 0.4596g	0.0063	-0.4596	70.04%	1.37%
Serbia	u=0.03 + 0.775g	0.03	-0.775	56.63%	3.87%
Okun's findings	u=0.3-0.07g	0.3	-0.07	80%	4.29%

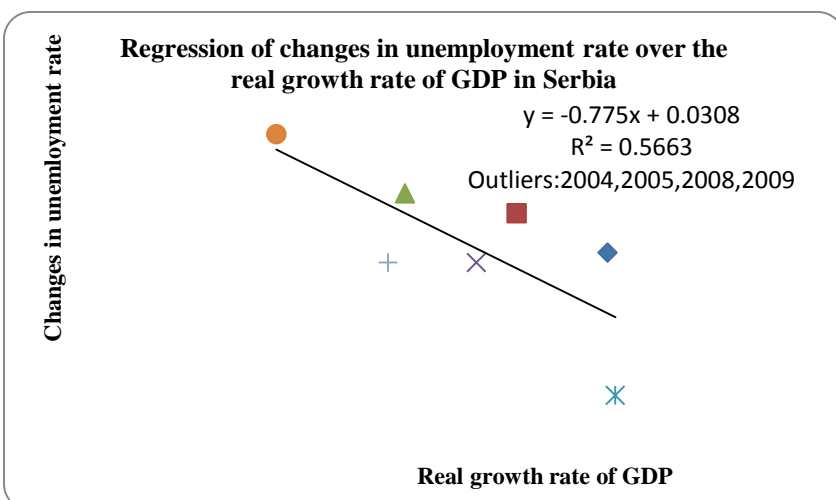
Figure 1- regressing changes in the unemployment rate to the real growth rate of GDP



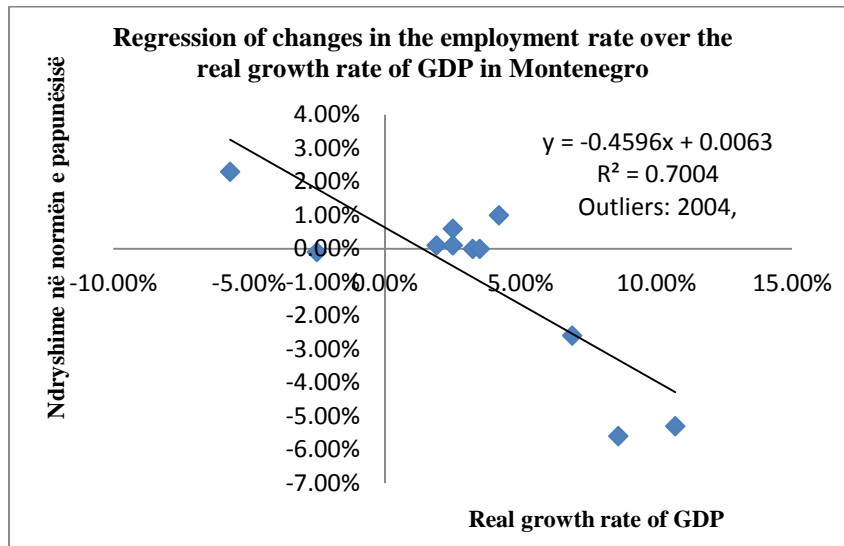
Albania	
Changes in unemployment rate (u)	Real growth rate of GDP (g)
	7.30%
0.20%	7.00%
-0.50%	5.70%
-0.05%	5.90%
-0.15%	5.50%
-0.10%	5.00%
-0.50%	7.70%
0.40%	3.50%
0.10%	3.00%
0.40%	1.30%
0.00%	1.30%



Macedonia	
Changes in unemployment rate (U)	Real growth rate of GDP (g)
	4.55%
1.40%	0.85%
0.10%	4.35%
-1.30%	5.03%
-1.10%	6.15%
-1.10%	4.95%
-0.20%	2.90%
-0.60%	2.80%
0.00%	3.10%



Serbia	
Changes in unemployment rate (U)	Real growth rate of GDP (g)
	5.34%
0.20%	5.30%
1.00%	4.12%
1.40%	2.68%
0.00%	3.60%
-2.70%	5.40%
2.60%	1.01%
0.00%	2.46%



Montenegro	
Changes in unemployment rate (U)	Real growth rate of GDP (g)
	3.10%
-10.05%	1.10%
0.10%	1.90%
0.10%	2.50%
1.00%	4.20%
-5.60%	8.60%
-5.30%	10.70%
-2.60%	6.90%
2.30%	-5.70%
0.60%	2.50%
0.00%	3.23%
-0.10%	-2.50%
0.00%	3.50%

The Results Applying The Basic Version of The Okun's Law

By analyzing the results of regressing changes in the unemployment rate to the real growth rate of GDP, presented in "Table 3 and Figure 1, it is shown that results, referring the parameters and the level of explanation for each of the countries included in the study, are incompatible with the Okun's law. Also, changes in terms of the above indicators are observed even among the countries included in the study.

To develop Okun's relationship for all countries, regressing changes of unemployment rate over real growth rate of GDP is done after avoiding outliers from the series of data. The results of these process by building up the simple linear regression models, shows that the values, of the parameter β are negative and the values of parameter α , positive, confirming the inverse relationship of Okun's law between changes in the unemployment rate and real growth rate of GDP.

In all countries, when there is no growth (i.e for $g = 0$), the unemployment rate is expected to be as much as the value of ' α ' presented in Table 3. Referring the values of β , for all countries of the region, it is shown that the real growth of GDP is associated by a reduction in unemployment. By analyzing the parameter β it is noticed that in Montenegro and Macedonia impacts of real growth of GDP in unemployment reduction are higher than in Albania and Serbia. So, Montenegro and Macedonia regarding this indicator are respectively, at the first and second positions, while Serbia and Albania, respectively at the third and fourth positions.

An important indicator is the ratio; $g = -\alpha / \beta$, where the values of this ratio by country are:

Albania -4.39% Serbia, 3.87%, Macedonia -2.89% and Montenegro-1:37%, which means that as long as the real growth of GDP of each country, is below these values, no unemployment reduction is going to be expected for each of the countries. Specifically, the reduction of unemployment in Albania is expected to occur only if the growth rate of GDP is more than 4,39%, and for every 1% increase, above 4:39%, unemployment is expected to decrease by 0.15%

Referring the terms of explanation, where the values of R^2 , respectively for each country are: for Albania 75.11%, Macedonia 72.23%, Montenegro 70.04% and Serbia 56.63%, which means that changes in the unemployment can be explained by changes of real economic growth rate only as much as the value of R^2 , while the rest of the changes in unemployment rate is caused by other factors not included in this model. For example in Albania the impact of other factors is $(100\% - 75.11\% = 24.89\%)$. So comparing to other countries referring this indicator, Albania occupies the first place, where 75.11% of the changes in the unemployment rate are explained by changes in the real growth rate of GDP. Other countries of the region, referring this indicator differ very little from Albania, except Serbia, where the value of $R^2 = 56.63\%$, is much lower, compared with the other countries of the region.

From the analysis it can be concluded that deviations from the law of "Okun's" in the region may be due to the degree of informality in the labor market or as the result of increased capital contribution to economic growth. Another reason for deviations from the Okun's law could be regional and global economic situation, where macroeconomic indicators for the studying period have been declining, unlike economic situation where "Okun" did his research. Even in USA referring this period 2000-2013 are found deviations from the Okun's law, despite the fact that these deviations from the Okun's law are very small.

The Output Gap Version of Okun's Law

While the first version of Okun's law relationship is based on easily accessible macroeconomic data, his second relationship about unemployment and economic growth was a function of the unemployment rate to the output gap. While the output gap shows the gap between the potential output and actual production.

Okun estimated output gap by seeking to identify how the economy can produce at full employment conditions. With full employment, Okun consider circumstances where a much lower level of unemployment to produce as much as possible, without generating more inflationary pressure. For the high unemployment rate, Okun argued, that the economy is being squandered its resources. In such a circumstance, it can be expected that the real rate of

production to be below its potential. In contrast, a very low rate of unemployment is associated with adverse scenario. Thus the relationship of Okun's second, or output gap version of Okun's law, took the form:

$$\text{Unemployment rate} = c + d * (\text{gap between potential output and actual output})$$

The coefficient 'c' shows the unemployment rate in conditions of full employment, while the coefficient 'd' to confirm the interpretation given in connection with 'c', must always take positive values in the relationship between unemployment rate and the output gap.

The main problem regarding the potential production and full employment lies in the fact that both are indicators of macroeconomic variable that can not be observed statistically. As such, these variables are exposed to different interpretations by the scholars. For example, at the time of writing his research, Okun, assumed that full employment happens when unemployment is 4%. Based on this assumption and the equation that expresses the relationship between the unemployment rate and output gap, Okun built a series of potential output. But in another assumption, with different unemployment level of 4%, would be built different series of potential output.

Besides this issue, Okun noted that the simplicity of these equations, can be problematic, this is why economists have proposed a number of other versions of Okun's law. These relationships are again called Okun's Law, even though they differ substantially from the basic equations of Okun's relationship.

The application of the output gap version of Okun's law in Albania, Macedonia, Montenegro and Serbia from year 2000-2013

In this case referring the yearly data for each country is constructed a simple linear regression model. By regressing the real GDP to time 't'. Then "the residuals" data generated by regression represents the differences between real growth and potential growth of GDP, in the economic language these results show the output gap.

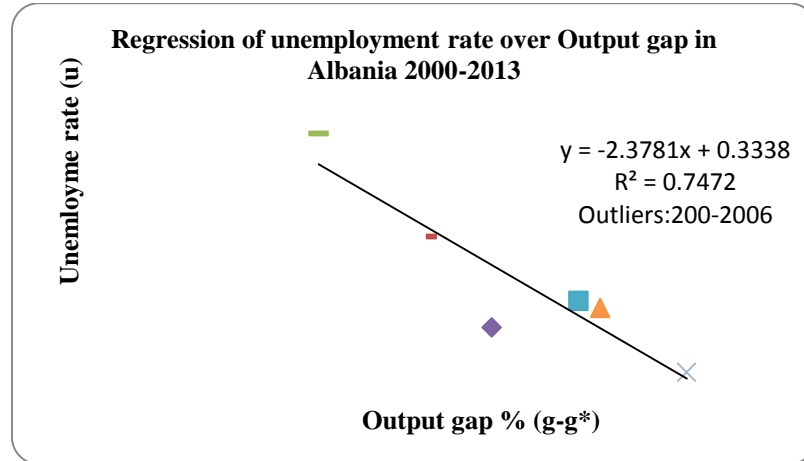
By treating the output gap as an independent variable, further for each country are constructed simple linear regression models, regressing the unemployment rate to the output gap. Before building up the models are assessed the outliers and excluded from the model. Mathematically the model took the form:

$$\text{Unemployment rate 'u'} = c + d * (\text{gap between potential output and actual output}; \gamma = Y_t - Y^*)$$

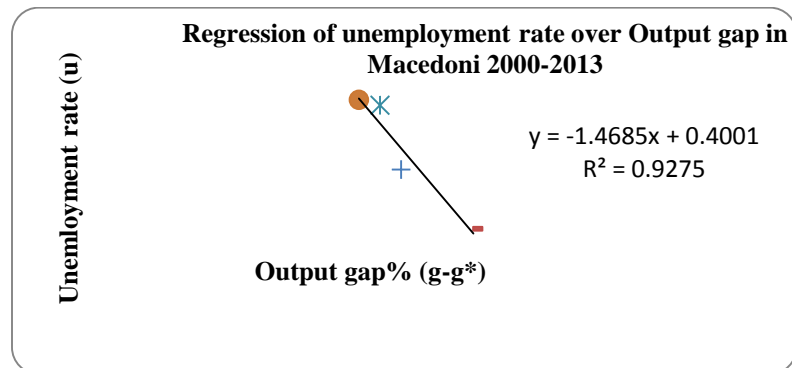
$$\text{Where } Y^* = \alpha + \beta * t$$

Results of regressing unemployment rate over output gap for regional countries from year 2000-20013

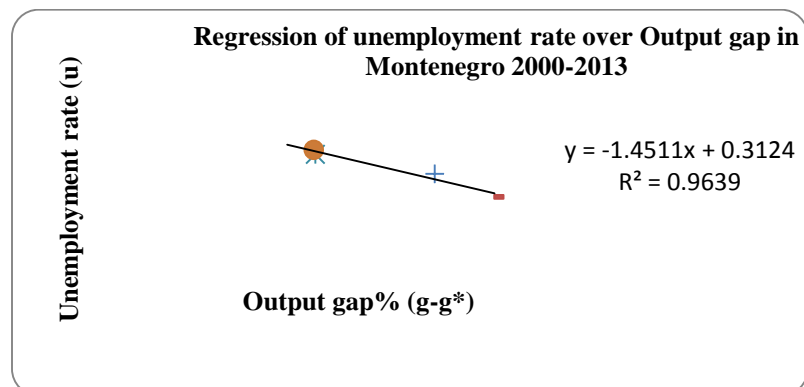
Figure 2- regressing unemployment rate over output gap for regional countries



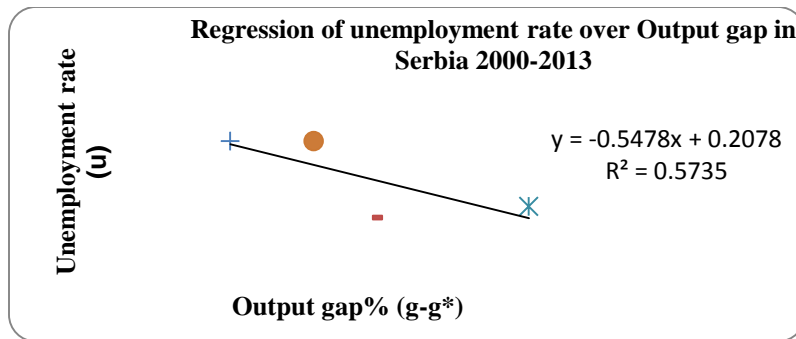
Albania	
Unemployment rate (u)	Residuals/ Output gap (g)
13.50%	0.34%
13.70%	0.39%
13.50%	1.41%
13.00%	3.57%
13.80%	-0.48%
14.20%	0.07%
14.30%	-0.07%
14.70%	-1.42%



Macedonia	
Unemployment rate (u)	Residuals / Output gap (g)
37.2%	2.14%
37.3%	1.83%
36.0%	2.46%
34.9%	3.54%



Montenegro	
Unemployment rate (u)	Residuals/ Output gap (g)
29.30%	0.01
30.30%	0.01
24.70%	0.05
19.40%	0.08



Serbia	
Unemployment rate (u)	Residuals/ Output gap (g)
18.50%	4.91%
20.80%	1.48%
20.80%	0.15%
18.10%	2.43%

Results of applying the basic version of the Okun's law

Results of regressing unemployment rate over the output gap are shown in Figure 2. For each country, it is confirmed the logical relation of Okun's law. Although graphical and analytical results for each of the countries involved in this study are inconsistent with the Okun's law because the values of the parameters and the values of explanation coefficient R^2 differ from "Okun's expectations. But we found that the deviations from Okun's law, are not essential.

Another characteristic of the region countries is that during this period, are found outliers. So, the outliers are not included in the models. It is important to mentioned that in all countries, except Albania, the outliers have occurred in the same period, meaning that the economies of the region except Albania are highly interdependent on one another. The Outliers in Albania do not coincide in time with those of other countries in the region. Such a result indicates that currently, the Albanian economy is not affected much by the economic development of these countries.

In conclusion, referring to the results, we can conclude that expectations regarding the relationship between unemployment rate over the rate of economic growth, if irregularity factors that cause deviations from the Okun's law are correctly identified and evaluated than the expected results of Okun's law can be met.

Conclusions

Statistical analysis, in accordance with the terms of the Albanian economy and those of the region countries involved in the study during the period (2000-2013), shows that Okun's law is valid, but of course in a particular form. Results of the study by countries to reduce the unemployment rate are as follow;

- In Albania the reduction of unemployment is expected to occur only if the growth rate of GDP is over 4.39% , and for every 1% increase, above 4.39%, unemployment rate is expected to decrease by 0.15%;

- In Macedonia the reduction of unemployment is expected to occur only if the growth rate of GDP is over 2.89%, and for every 1% increase above 2.89%, unemployment rate is expected to decrease, with 0.45%;
- In Montenegro the reduction of unemployment is expected to occur only if the growth rate of GDP is over 1.37% , and for every 1% increase above 1.37% unemployment rate is expected to decrease by 0.459%;
- While the reduction of unemployment in Serbia is expected to occur only if the growth rate of GDP is over 3.87%, and for every 1% increase above 3.87%, unemployment rate is expected to decrease by 0.775%;

But in terms of the explanation, referring the values of R^2 , the results are as follow:

- In Albania $R^2 = 75.11\%$, explains that only 75.11% of the changes in the unemployment rate are explained by changes in the real growth rate of GDP, while the difference (100% -75.11%) explains the impact of the other factors that are not included in the model
- In Macedonia $R^2 = 72.23\%$, explains that only 72.23% of the changes in the unemployment rate are explained by changes in the real growth rate of GDP, while the difference (100% - 72.23%) explains the impact of the other factors that are not included in the model
- In Montenegro $R^2 = 70.04\%$, which explains that only 70.04% of the changes in the unemployment rate are explained by changes in the real growth rate of GDP, while the difference (100% -70.04%) explains the impact of the other factors that are not included in the model
- In Serbia $R^2 = 56.63\%$, which explains that only 56.63% of the changes in the unemployment rate are explained by changes in the real growth rate of GDP, while the difference (100% - 56.63%) explains the impact of the other factors that are not included in the model

The deviations from the Okun's law are not very strong, and referring to other studies conducted recently, it is shown that the deviations from the Okun's law are correlated with the impact of regional and global economic situation, where macroeconomic indicators for this period have been declining, unlike economic situation where "Okun" did his research. Even in USA economy, referring to this period are found deviations from the Okun's law, despite the fact that the deviations are very small to those of Okun's law.

Also the rate of informality in the labor market could be another reason of the deviations from Okun's law. But it is important to note that the Okun's relationship is still a reliable tool and useful forecast, when taken into consideration the factors that influence the instability of this relationship.

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