The Relationship Between Unemployment And Economic Performance Of The Slovak Regions: Does The Disparity Matter?

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Abstract
The Slovak Republic, although it is a relatively young and small state, is a very diverse country. Regional disparities have historical background and persist until nowadays. The most obvious disparities are in the unemployment and the economic performance of regions. On one side, there is more developed west part of the country (the Region of Bratislava is the 6th richest region in the EU) and on the other side, less developed are east (the Region of Prešov) and south regions (the Region of Banská Bystrica). The relationship between unemployment and economic performance, usually measured by the GDP or the GDP growth, is known as Okun´s Law. Thus, the GDP or its growth and unemployment are correlated macroeconomic variables. The aim of the paper is to compare the main macroeconomic variables of the GDP growth and the unemployment rate on the regional basis in the Slovak Republic and to verify the validity of the Okun´s Law in the Slovak Republic on the regional data. Further on, the estimation of Okun coefficients for overall country most developed and less developed regions is made. The result shows that the disparity between regions is evident in the estimated coefficients.

Keywords: Regional GDP, unemployment, Okun´s Law, regional disparities

Introduction
The regional disparities in the Slovak Republic are the most obvious in the unemployment rate and the produced output (regional GDP). There is more developed west part of the country (except for the Region of Košice) and less developed east and south parts of Slovakia. In accordance with the administrative division of the Slovak Republic to 8 regions, the most developed is the Region of Bratislava. To the contrary, the less developed is the Region of Prešov and the Region of Banská Bystrica. In the Region of Banská Bystrica the districts with the highest rate of unemployment are situated, persistently exceeding 30%. Factors that negatively affect the

unemployment, are in particular education of population in regions, underdeveloped infrastructure, the low demand of local companies for workers and insufficient job creation, low level of FDI inflow, as well as low demand of population in regions for goods and services. It is known that the unemployment rate and economic performance, usually measured by the GDP or by its growth, are related macroeconomic variables. This relationship known as Okun´s Law is in the interest of many theoretical and empirical papers or research studies. The aim of the paper is to verify the validity of Okun´s Law in the Slovak Republic using the regional data on the GDP and the unemployment rate. To achieve this, first part of paper deals with theoretical background of Okun´s Law. Second part shows and analyses the economic performance and the unemployment in the Slovak regions and identifies the reasons of lagging some regions behind the others, more developed regions. The next part estimates the Okun coefficients using panel regressions for the Slovak Republic and separately for the most and the less developed regions.. Further on, since the Okun coefficients are estimated, the growth of GDP necessary to reduce the unemployment rate by 1% point is calculated. The last part of the paper concludes and summarizes the results.

The Okun´s Law – theoretical view
        The following part of the paper briefly characterizes Okun´s Law and summarizes the results of the estimation of the Okun coefficients in different papers and research studies.
        The relationship between unemployment and economic growth was observed and formally written at the beginning of 60´s of the 20th century by Arthur M. Okun. Okun (Okun, 1962) has theoretically described this relationship. Also, the first estimation of relationship was made. The analysis has covered the period 1947 – 1960. He has concluded that 3% growth of output leads to the decline in the cyclical unemployment rate by 1% point. Knotek (Knotek, 2007) has formulated three methods of estimation the Okun coefficient. There is difference, gap and dynamic version of Okun´s Law. The paper has analysed the relationship between the unemployment and the produced output in the USA for the period 1948 – 2007 by the use of rolling regressions with 52 quarter data. The purpose of this method was to test the time stability of the estimated Okun coefficient. The stability was not confirmed with the sharp (steep) rise of coefficient in 1984. Similar result is given by Owyang and Sekhposyan (Owyang-Sekhposyan, 2012). They have used quarter data for the USA for the period 1949-2011. By the use of already mentioned three versions of Okun´s Law, they have concluded the instability of Okun coefficient, particularly in time of recession. The estimation of Okun coefficient for the USA for period 1959-1998 by the use of regional data was made also by Freeman (Freeman, 2000).

Apergis and Rezitis (Apergis-Rezitis, 2003) have estimated Okun coefficients for Greece regions (8 regions). The dataset captures the period 1960-1997. Estimated coefficients for regions do not substantial differ, except for 2 regions. The important factor of estimation is time variable. Since year 1981, the unemployment in Greece regions is less sensitive to changes in regional GDP as in previous years. Villaverde and Maza (Villaverde-Maza, 2009) have analysed Spanish regions (17 regions) since 1980 until 2004 by the use of gap version of Okun´s Law. They have found considerable differences among regions. The main factor affecting the Okun coefficients is the labour productivity. Regions with low growth in productivity have also the low value of coefficients, while regions with higher growth have this value higher, too.

The development of regional GDP and unemployment

Among the Slovak regions, the produced output substantially differs. The most developed Region of Bratislava had at the beginning of analysed period in 2001 GDP more than twice higher as the less developed regions. The growth of production was also the fastest. On the other hand, the less developed regions are the Region of Banská Bystrica and the Region of Prešov, as seen in Graph 1. There are more reasons of lagging behind the regions of south and east Slovakia. The substantial part of industry is concentrated in the west part of the Slovakia with the focus on the automotive and electronic industry. Such concentration creates favourable conditions for existing companies to enlarge the business activities or establishing new companies in industrial relationships, usually as suppliers of craftworks and semi finished products or services. The increase in the FDI inflow into the Slovak Republic was directed mostly to the west and northwest regions. This situation has led to the growth in the production and fall in the unemployment (the growth of employment, too) in these regions. However, it has induced the increase in the regional disparities. The situation in the east (except for the Region of Košice, exactly the city of Košice itself) and the south of the Slovakia is different. There are many factors in these regions that negatively affect the volume (size) of produced output and consequently influence the unemployment. These are underdeveloped infrastructure, low FDI inflow and low demand for goods and services of local inhabitants, that means low consumption. Together with the education of inhabitants (insufficient educational structure of inhabitants in comparison to the requirements of companies), low demand for workers by local firms and low job creation, it causes further disparities in the unemployment rate between the Slovak regions. To consider regional GDP, the Slovak Republic might be divided into two regions – the Region of Bratislava and the rest of the country. These regions do not achieve even the half of the GDP produced

in the Region of Bratislava. Moreover, this ratio is decreasing since 2001 to 2013. It is not surprising that the Region of Bratislava is the 6th richest region among the EU regions.

Graph 2 shows the unemployment rate in the Slovak regions in the period 2001 – 2013. The development of the unemployment rate and GDP (Graph 1) in regions implies the negative relationship of these variables. The lowest unemployment rate, far below the Slovak average, has the Region of Bratislava. To the contrary, the Region of Prešov and the Region of Banská Bystrica have for a long period highest unemployment rates. As seen in Graph 2, the unemployment rate in pre-crisis period has been falling in all regions. This was caused by the growth of GDP. Since the financial crisis has begun, the GDP has decreased. Reversely to the GDP growth, recession has caused the raise in the unemployment in 2008 and even grater increase in 2009. The trend of gradually rising unemployment has followed until 2012 with the slight decrease in the unemployment rate. The development of regional GDP and unemployment rate indirectly confirms the validity of Okun´s Law.

Graph 1: The real GDP of the Slovak regions
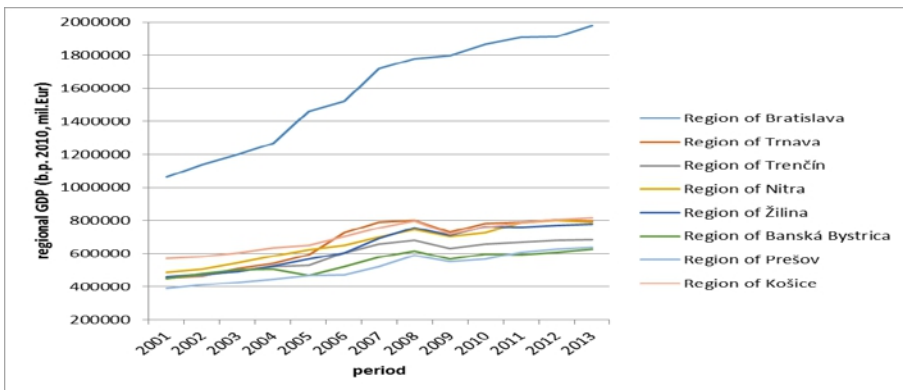
Source: The Slovak Statistical Office

Graph 2: The unemployment rate in the Slovak regions
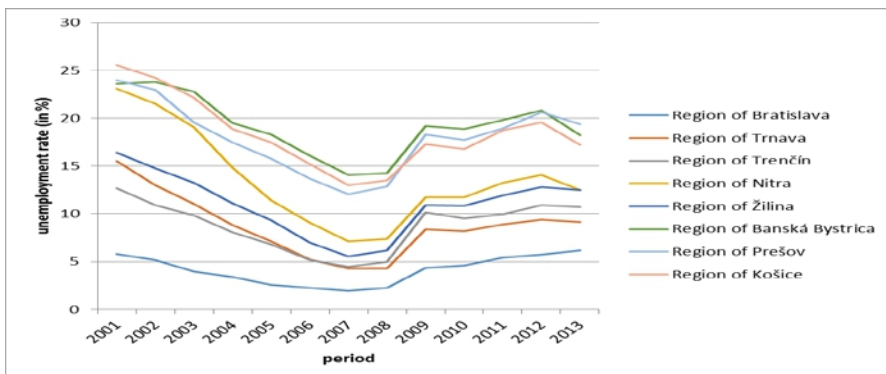
Source: The Slovak Statistical Office

Methodology

       To determine the sensitivity of unemployment rate to the economic growth in the condition of the Slovak regions, the knowledge of Okun´s Law was applied. In the estimation, data from 8 regions for the period 2001 – 2013 was used. The regional data for the unemployment and regional GDP is available in the Slovak Republic only for this time period. The data for previous years were not collected on the regional level. Moreover, the GDP data is in nominal values. Therefore, the data was adjusted by the GDP deflator and transformed to the GDP growth in the particular regions. Using the "difference" version of Okun´s Law (Knotek, 2007), we have estimated Okun coefficients. The data captures all Slovak regions. Data for unemployment rate, but mainly for the GDP, shows the different economic position of the Region of Bratislava. Due to this, we excluded the Region of Bratislava from the analysis and have run regression only with 7 regions. The main goal of the paper is to compare, whether the relationship between unemployment and the economic performance differs among the Slovak regions. Although, the Slovakia is a small country, we have expected lower Okun coefficients in less developed regions of the east and south Slovakia (the Regions of Prešov, Košice and Banská Bystrica) and higher coefficients in more developed west and northwest part of Slovakia (the Regions of Nitra, Trnava, Trenčín and Žilina). In other words, 1% of GDP growth in more developed regions induces higher decline in the unemployment rate. Also, the lower GDP growth is necessary to reduce the unemployment rate by 1% point.

       To estimate Okun coefficient, panel data was used. This captures the period 2001 – 2013 and 8 cross-sectional units that represent 8 Slovak regions. With the respect to testing statistics, the OLS regression with pooled data was used. The regression equation is as follows:

$$\Delta UT_{it} = \alpha + \beta g_{it} \tag{1}$$

where: ΔUT is the year to year change in the unemployment rate, g is the GDP growth of particular region, i represents the index of a region, t is time period, α is constant and β represents Okun coefficient.

Results

       The results of the estimations of Okun´ Law for the Slovak Republic confirm its validity. The variable economic growth (GDP growth) is in all regressions statistically significant at 1% level. Thus, economic growth has positive effect on the reduction of the unemployment. The minus sign of Okun coefficient means that the growth in the output induces the decline in the unemployment rate. However, the size of the descent for regions is different. This is given by the different parameter β, which represents Okun coefficient or the slope of the regression line.

The result of the estimation of Okun´s Law that captures all Slovak regions is given in the Table 1. The interpretation of estimation is follows: the 1% GDP growth (g) % implies the decrease in the unemployment rate by 0.21% point. In the case of zero growth, or in the stagnation, unemployment rise by 0.43% point. For that reason, the stagnation is a serious threat for the Slovak economy. There are two reasons of rising unemployment in the stagnation or in the very low growth. The first factor is the labour growth as a result of the growth of the population. If the new workers do not obtain a job, they remain unemployed and the unemployment rate will rise. The second reason is the growth of the productivity. If the productivity rise, but the size of the output remain unchanged, the fewer workers are needed. This is reflected in the rise of unemployment.

Table 1: Result of Okun coefficient estimation (all regions)

Total unemployment [ΔUT_{it}]		p – value	
constant	0.432228 (0.210673)	0.0430	**
g_{it}	-0.205589 (0.0313265)	2.86e-09	***
R^2		0.314219	
- pooled OLS F test: p = 0.680627; LM test: p = 0.430495; Hausman test: p = 0.0981266 - 96 observations, 12 time periods and 8 cross-sectional units - dependent variables in square brackets - standard error in parentheses - ***, **, * - statistical significance at 1%, 5%, a 10% level			

Due to the position of the Region of Bratislava in the Slovak economy and its disparity from other regions, we have decided to estimate the Okun coefficient for the Slovak Republic with the exclusion of this region from the analysis. We have assumed that the Okun coefficient will be lower; that means 1% growth induces the lower decline in the unemployment rate in comparison to analysis when the Region of Bratislava is included. This assumption was not confirmed. 1% growth in the output will cause the decline in the unemployment rate by 0.22% point. This is almost the same value as in all regions analysis. Also, the zero growth would lead to 0.38% point rise in the unemployment rate, while it is the 0.42% point in the previous analysis. Although the Region of Bratislava is evidently more developed, the result is very similar.

Table 2: Result of Okun coefficient estimation (without the Region of Bratislava)

Total unemployment [ΔUT_{it}]		p – value	
constant	0.382357 (0.228554)	0.0982	*
g_{it}	-0.218549 (0.0341058)	8.78e-09	***
R^2		0.333670	
- pooled OLS F test: p = 0.910747; LM test: p = 0.181516; Hausman test: p = 0.390978 - 84 observations, 12 time periods and 7 cross-sectional units - dependent variables in square brackets - standard error in parentheses - ***, **, * - statistical significance at 1%, 5%, a 10% level			

Slovakia, although it is a small country, has significant regional disparities. The most developed is the Region of Bratislava. It is following by huge margin by other regions ending with the less developed Region of Prešov with the lowest GDP. The same situation occurs when analysing the unemployment rate. The lowest unemployment rate is in the Region of Bratislava. Taking not into account the Region of Bratislava, the Slovak regions might be divided into two groups by the level of unemployment rate. The first group represents regions in the west and northwest of the Slovakia – the Regions of Nitra, Trnava, Trenčín and Žilina with the unemployment rate higher than in the Region of Bratislava, but lower than other regions. Then, the second group consists of the Regions of Prešov and Košice located in the east part of the Slovakia and the Region of Banská Bystrica located in the middle of south Slovakia. These disparities are the motivation to estimate the Okun coefficient for these two groups of regions. We have expected that the Okun coefficient in the more developed regions is higher than in the less developed regions. This assumption was confirmed, as seen in Table 3 and Table 4. The 1% GDP growth in the more developed regions induces the reduction in the unemployment rate by 0.23% point, while it is only 0.21% point in the less developed regions. The constant is not statistically significant in analysing east and south regions. However, it is significant in the west and northwest regions, but only at 10% level. The interpretation of this result is that if the GDP growth in these regions is zero (stagnation of regions), the unemployment rate is rising by 0.52% point. If the constant would be statistically significant also in less developed regions, this growth would be only 0.21% point. These results confirm the assumption that economic growth has higher impact on the reduction of the unemployment rate in the more developed part of the Slovak Republic. Such situation is not optimal and will lead to the further growth in disparities between the Slovak regions.

Table 3: Result of Okun coefficient estimation (the Regions of Prešov, Košice and Banská Bystrica)

Total unemployment [ΔUT_{it}]		p – value	
constant	0.214891 (0.382655)	0.5616	
g_{it}	-0.206351 (0.0615458)	0.0020	***
R^2		0.248474	
- pooled OLS F test: p = 0.769115; LM test: p = 0.30195; Hausman test: p = 0.492205 - 36 observations, 12 time periods and 3 cross-sectional units - dependent variables in square brackets - standard error in parentheses - ***, **, * - statistical significance at 1%, 5%, a 10% level			

Table 4: Result of Okun coefficient estimation (the Regions of Nitra, Trnava, Trenčín and Žilina)

Total unemployment [ΔUT_{it}]		p – value	
constant	0.521466 (0.282285)	0.0711	*
g_{it}	-0.229017 (0.0400833)	7.77e-07	***
R^2		0.415089	
- pooled OLS F test: p = 0.74123; LM test: p = 0.329388; Hausman test: p = 0.875981 - 48 observations, 12 time periods and 4 cross-section units - dependent variables in square brackets - standard error in parentheses - ***, **, * - statistical significance at 1%, 5%, a 10% level			

To answer the question whether the disparity matters, the results of Okun coefficient estimation show that in the less developed regions, 1% GDP growth induces the lower decrease of the unemployment rate than in the more developed regions. As a result, a higher GDP growth is necessary in order to lower the unemployment rate by 1% point in these regions. Table 5 shows the GDP growth necessary to reduce the unemployment rate by 1% point in four analysed cases. Calculations were made with the respect of estimations by the inclusion of constant. Even it is not statistically significant in one regression, the same methodology of calculation and the same approach is appropriate. As seen, excluding the Region of Bratislava has almost no effect on calculated GDP growth. The difference in the GDP growth necessary to decrease the unemployment rate by 1% point is very small – only 0.09% point. However, the disparity is seen in considerable difference between the Regions of Prešov, Košice and Banská Bystrica, and Regions of Nitra, Trnava, Trenčín and Žilina. To reduce the unemployment

rate by 1% point in the first regions, the 3.80% GDP growth is necessary, while it is only 2.09% growth in the more developed regions.

Table 5: The growth necessary to reduce the unemployment rate by 1% point

Region	Growth (in %)
All regions	2.76
All regions except for Region of Bratislava	2.83
Regions of Prešov, Košice and Banská Bystrica	3.80
Regions of Nitra, Trnava, Trenčín and Žilina	2.09

Conclusion

The aim of the paper was to estimate the Okun coefficient for the Slovak Republic by the use of regional data. Further, the estimations for two groups of regions were made – the more developed and the less developed regions. Estimated Okun coefficients and calculated GDP growth necessary to reduce the unemployment rate by 1% point have confirmed the disparity between these regions. A higher GDP growth is necessary to decrease the unemployment rate in the Regions of Prešov, Košice and Banská Bystrica, that means the less developed regions. This situation is not optimal and will lead to further increase of the regional disparities. To conclude, the regional disparities affect the relationship between unemployment and economic performance in the particular regions.

Acknowledgements

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