

LABOR MARKET COMPARISON IN THE CONTEXT OF REGIONAL DISPARITIES IN THE SLOVAK REPUBLIC

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Abstract: The Slovak Republic is characterized by regional disparities, which are also reflected in the labor market. The aim of our paper is to examine the development of the Slovak labor market and evaluate the level of regional labor markets on the basis of selected indicators in the years 2001-2019. We examine the situation on the labor market in the regions of the Slovak Republic on the basis of the development of economic activity, employment, unemployment, average wage and the proportion of employed with tertiary education. To evaluate regional disparities in our article, we use two methods: the scoring method and the method of a uniform normalized variable. With both methods used, the Bratislava region was best placed in 2001 and in 2019. The worst evaluation in 2001 was achieved by the Nitra region and in 2019 by the Prešov region.

Keywords: labor market, regional labor market, indicators of regional disparities, scoring method, method of uniform standardized variable.

1 Introduction

Resolving regional disparities is still a major problem in the Slovak Republic. Labor market problems in terms of regional differences are attractive topics addressed by many authors, such as Bezák (2001) or Škrovánková (2018), who focused on examining indicators of regional disparities and their impact on the labor market. Slovakia is still one of the EU countries with the highest regional differences in performance and productivity indicators, and in the main labor market indicators (Neradný, Lalinský, 2016).

The labor market is a regulated market and is characterized by an imbalance between the amount of work offered by the population and the amount of work required by companies and public administration organizations. It works with the rarest capital of the economy, and that is human capital. Work force is one of the most important factors of production because it contributes to the economic growth of a state or region (Simionescu et al., 2016; Cyrek, 2017). The accession of the Slovak Republic to the EU and the implementation of important reform changes that the Slovak economy had to go through at the beginning of this century and the onset of the boom in the world economy brought a significant inflow of foreign direct investment into the Slovak economy. It also affected labor market developments and helped reduce unemployment.

When examining balance or imbalance in the labor market, the main role is played by employed and unemployed persons, who make up the economically active population. Unemployment is a situation on the labor market where people who want to work and can work cannot find work. It arises as a result of a whole set of phenomena and processes in the economic, social and political spheres. Unless it becomes mass, it is not considered a serious economic or social problem. It is usually based on the fact that the existence of unemployment is actually a natural phenomenon and an attribute of a free society based on a market mechanism and democracy (Rievajová et al., 2006). Unemployment is a natural part of market and mixed economies and can even be beneficial for economic growth and labor productivity. On the other hand, a high level of unemployment has very adverse economic and social consequences, for the whole economy, but also for the individual regions affected by this unemployment. For this reason, it is also necessary to examine the development and unemployment and the labor market in general in individual regions.

Many authors, such as Goodman (1970) or Fischer and Nijkamp (1987) and others, have defined the regional labor market and are based on a common idea. Under the term regional labor market, we imagine a region in which there is territorial harmony (territorial agreement) between labor demand and supply, which is reflected in the fact that economically active persons living in a given region usually work in this region and, if necessary, they are also looking for a job. On the demand side, compliance is reflected in the fact that most employees of companies and organizations located in the region come from the same region and the economically active population of the region usually fills vacancies or new jobs. Bezák (2001) the term regional labor market means a territory, a market in which the decisive part of real and potential flows for work is realized within the region and flows flowing across its borders are not significant. In addition to economic, social disparities arise there, which are associated with the population, health care, education, employment, unemployment, social protection, family accounts, crime and culture (Michálek, 2014).

In the labor market of the Slovak Republic, we can observe significant regional differences, which result from different primary potential (location and natural conditions), from various development possibilities (natural resources, tourism), economic structure (industry), and demographic differences and from the level of infrastructure. An important aspect of these differences is also the significantly higher economic level of the Bratislava region compared to other regions of the Slovak Republic, which means that the inhabitants of more distant regions also come to work in the Bratislava region.

The aim of our paper is to examine, compare and evaluate the development of the labor market in the regions of the Slovak Republic in the years 2001-2019.

2 Materials and Methods

In professional and scientific work dealing with regional disparities and regional development, we encounter several studies that offer a wide selection of indicators depending on the set goal. This fact conditioned a wide and differentiated selection of indicators of regional disparities for individual authors. According to Sloboda (2006), the most frequently used indicators of regional disparities monitored in Slovakia are GDP, unemployment rate, average wage, economic activity rate.

Matlovič et al. (2008) worked with ten selected socio-economic indicators and evaluated their development within regional disparities (GDP per capita, labor productivity, monthly employee costs, employment rate, unemployment rate, net monthly income per person, net monthly expenditure per person, average monthly wage, gross birth rate, completed dwellings). Other authors (Rajčáková, Švecová, 2011) used indicators, partial indicators of demographic profile, employment of the population, labor market, production performance, infrastructure equipment and a complex socio-economic level in the evaluation of disparities in Slovakia.

To assess the social and economic development of Granberg et al. (2000) used a methodology that includes basic indicators for nine evaluation units. Researchers Andreev et al (2008) developed a more extensive system of indicators, consisting of a block of key indicators and a block of other indicators. According to them, the proposed blocks of indicators characterize the development of the social, economic and environmental spheres of the region. Syroezhin (1980) proposed the setting of dynamics indicators and proved that the dynamic characteristics are in order, which allows their mutual comparison, even if the analyzed indicators are incomparable in the statistical format.

The aim of our paper is to examine the development of the Slovak labor market and evaluate the level of regional labor markets on the basis of selected indicators in the years 2001-2019. We will consider NUTS3 regions as regions of Slovakia, namely: Bratislava region (BA), Trnava region (TT), Trenčín region (TN), Nitra region (NR), Žilina region (ZA), Banská Bystrica region (BB), Prešov region (PO), Košice region (KE).

In our article, we use the indicators listed in Table 1 to evaluate the level of the labor market in the regions of the Slovak Republic.

Tab. 1: Selected indicators and sources of data

Indicator	Source of data
economic activity rate (%)	VBD_SK_WIN:pr3102qr
employment rate (%)	VBD_SK_WIN:pr3102qr
unemployment rate (%)	VBD_SK_WIN:pr3102qr
average wage (Euro)	VBD_SK_WIN:np3110rr
proportion of employed with tertiary education (%)	VBD_SK_WIN:pr3116qr

In the paper, the methods of analysis, comparison, synthesis and scoring method were employed. The method of analysis was used to analyse the labour market indicators in the regions of the Slovak Republic. The method of comparison was used to compare the selected indicators in the Slovak regions and to compare the results of the two multicriteria methods used. The method of synthesis was used to draw conclusions resulting from the analysis.

In our article, we use two methods to evaluate regional disparities: the scoring method and the uniform normalized variable method. The scoring method is one of the simple multicriteria methods. Its advantage is the ability to summarize indicators captured in different units into a single synthetic characteristic, which is a dimensionless number. Its disadvantage is that it is based on the absolute variability of indicators, while it cannot affect their relative variability (Michálek, 2012). In scientific works, the scoring method is used for various purposes. As a method of evaluating the level of regions on the basis of several indicators and subsequently evaluating regional differences, it is mentioned, for example, by Kutscherauer et al. (2010), Tuleja (2010), Svatošová and Novotná (2012), Hamada (2014) and others.

In the scoring method, points are awarded to individual regions on the basis that the region with the best value of the indicator receives 100 points, and the other regions receive points as follows:

- if the maximum value is the best value (economic activity rate, employment rate, average wage, proportion of employed with tertiary education):

$$p_{ij} = \frac{v_{ij}}{v_{jmax}} \times 100 \quad (1)$$

- if the minimum value is the best value (unemployment rate):

$$p_{ij} = \frac{v_{jmin}}{v_{ij}} \times 100 \quad (2)$$

where:

v_{ij} = the value of j -th variable in the i -th region

v_{jmax} = highest value of the j -th variable

v_{jmin} = lowest value of the j -th variable

p_{ij} = the scores of the i -th region for the j -th variable.

Next, the integral variable d_i , as the arithmetic average of the points for the indicators set for each region is calculated. The best results of observed variable reaches the region in which the integral indicator d_i reaches the maximum value.

The second method - the method of uniformly normalized variable is characterized by the allocation of points to individual regions through the technique of uniform normalization, which was used, for example, by Madajová, Michálek and Podolák (2014), Bucher (2016). In this way, the values of the indicators in different units of measurement are standardized to a uniform scale of $\langle 0, 1 \rangle$ as follows:

- if the maximum value is the best value (economic activity rate, employment rate, average wage, proportion of employed with tertiary education):

$$Z_{ij} = \frac{X_{ij} - X_{jmin}}{X_{jmax} - X_{jmin}} \quad (3)$$

- if the minimum value is the best value (unemployment rate):

$$Z_{ij} = \frac{X_{jmax} - X_{ij}}{X_{jmax} - X_{jmin}} \quad (4)$$

where:

X_{jmax} = highest value of the j -th variable,

X_{jmin} = lowest value of the j -th variable,

X_{ij} = the value of j -th variable in the i -th region,

Z_{ij} = the scores of the i -th region for the j -th variable.

Next, the integral variable Y_i , as the arithmetic average of the scores for the indicators set for each region is calculated. The best results of observed variable reaches the region in which the integral indicator Y_i reaches the maximum value.

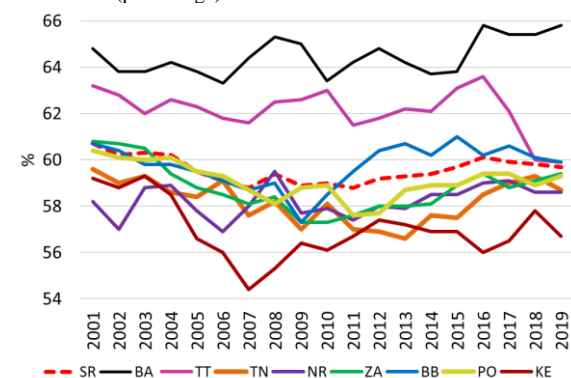
3 Results and Discussion

We will examine the situation on the labor market in the regions of the Slovak Republic on the basis of an examination of the development of economic activity, employment, unemployment, the average wage and the share of workers with tertiary education. To evaluate the situation on the labor market in individual regions of the Slovak Republic, we will use the scoring method and the method of an even standardized variable. The results of both methods are then compared to determine compliance, respectively differences in their results.

3.1 Development of the labor market in the regions of Slovakia

The starting point for examining the situation on the labor market is the evaluation of economic activity, i. summary of employed and unemployed persons. We evaluate economic activity in the regions of the Slovak Republic using the economic activity rate of population indicator aged 15 and over in percentage. Its development in the regions of the Slovak Republic is shown in Figure 1.

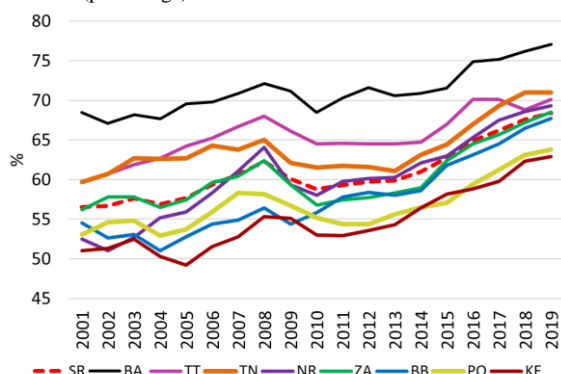
Figure 1: Development of economic activity rate in the regions of Slovakia (percentage)



Source: Statistical Office of the Slovak Republic (2021), own processing.

In the observed period, the development of the rate of economic activity in the regions of the Slovak Republic is very volatile. The highest rate of economic activity in the whole period is in the Bratislava region, in 2016 and 2019 up to 65.8%. The Trnava region also showed values higher than the Slovak average, but after 2016, there was a decline in the rate of economic activity. The lowest rate of economic activity is in the Košice region; in 2007 it was only 54.4%. In 2019, compared to 2001, the rate of economic activity was higher only in the Bratislava region and the Nitra region. Another examined indicator of the labor market is employment, which significantly affects the living standards of the population, but also the economic performance of the region. We examine employment using the indicator of the employment rate of persons aged 15-64 (percentage), its development in the regions of the Slovak Republic is shown in Figure 2.

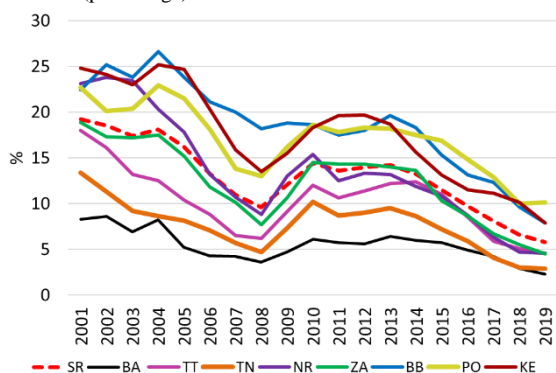
Figure 2: Development of employment rate in the regions of Slovakia (percentage)



Source: Statistical Office of the Slovak Republic (2021), own processing.

The development of employment can be described as fluctuating, with an increasing tendency. The highest employment rate is in the Bratislava region; in 2019 it reached up to 77.1%. Employment in the Trnava region was the second highest, but in 2018, its decline was recorded. Trenčín region is also one of the regions with a higher employment rate; in 2019 it reached the level of 71%. The regions with the lowest employment rates were Košice region and Prešov region. The most significant increase in the employment rate in 2019 compared to 2001 was recorded in the Nitra region, up to 16.8 p.p. Another indicator examined is unemployment, which we evaluate using the unemployment rate in percentage. Its development in the regions of the Slovak Republic is expressed in Figure 3.

Figure 3: Development of unemployment rate in the regions of Slovakia (percentage)



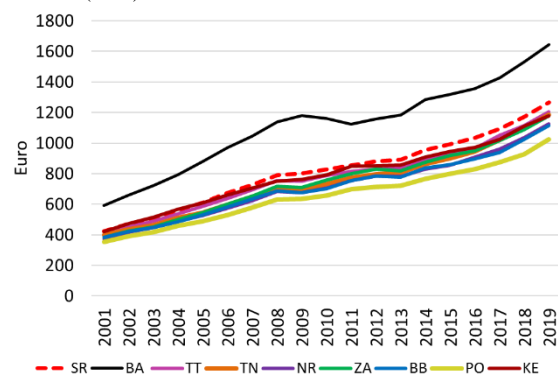
Source: Statistical Office of the Slovak Republic (2021), own processing.

Unemployment in the regions of Slovakia was very high in the first years of the observed period, in many regions it was higher than 20%. However, its development was positive, until 2008

unemployment fell, then due to the economic crisis, and after 2013 it is recorded again. In 2019, unemployment in all regions of Slovakia reached the lowest values of the entire period under review. The lowest unemployment was in Bratislava region, in 2019 only 2.3%, in Trenčín region 2.9%. Unemployment below 5% in 2019 was also achieved by regions: Trnava region, Nitra region, Žilina region. If we compare the unemployment rate in the first and last year, the largest decrease in unemployment occurred in the Nitra region (by 18.5 p.p.) and in the Košice region (by 16.9 p.p.).

An important indicator of the labor market is wages. It is the price of labor, and the living standards of the population, the amount of their consumption and savings depend on it. The development of the average monthly wage in the regions of the Slovak Republic is shown in Figure 4.

Figure 4: Development of average wage in the regions of Slovakia (Euro)

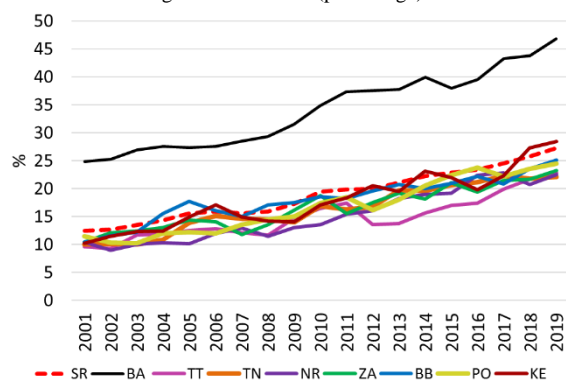


Source: Statistical Office of the Slovak Republic (2021), own processing.

In the period 2001-2019, a significant increase in the average monthly wage was recorded in the regions of the Slovak Republic, by an average of 198.8%. In Figure 4, we can observe an increase in average wages, with the exception of a slight decrease in average wages in crisis years. Significantly, employees in the Bratislava region achieve the highest wages. These wages increase the average wages in the Slovak Republic because the wages of employees in other regions are below the Slovak average (except for the Košice region in 2002-2004).

Employees from the Prešov region have the lowest wages, accounting for only 62.3% of wages in the Bratislava region. During the period under review, average wages increased the most in the Bratislava region, from 591.7 Euro to 1646 Euro. The average wage in the Prešov region represented in 2011 60% of the average wage in the Bratislava region, in 2019 it was 62%, which indicates a slight narrowing of the differences in the level of the average wage in the regions of Slovakia. The fifth selected indicator of the labor market is the share of employees with tertiary education, its development in the regions of the Slovak Republic is shown in Figure 5.

Figure 5: Development of proportion of employed with tertiary education in the regions of Slovakia (percentage)



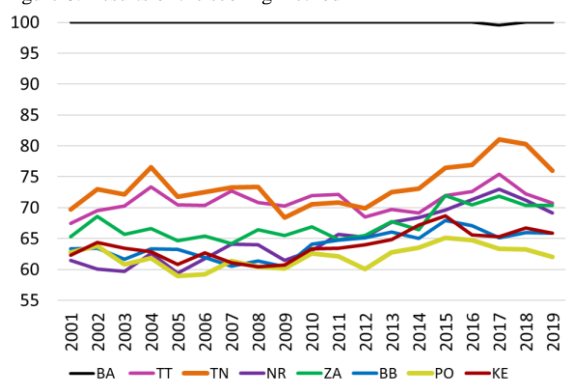
Source: Statistical Office of the Slovak Republic (2021), own processing.

The share of employees with tertiary education has fluctuated, with a growing trend. Figure 5 shows the huge distance of the Bratislava region from other regions of Slovakia. The share of workers with tertiary education in the Bratislava region increased from 24.8% in 2001 to 46.8% in 2019. The differences between other regions are not very significant. The lowest share of workers with tertiary education was in Trnava region and Nitra region, in 2019 in Trenčín region. Apart from the Bratislava region, the highest increase in the share of tertiary education was recorded in the Košice region (by 18.3 p.p.) and the Banská Bystrica region (by 14.7 p.p.)

3.2 Evaluation of the situation on the labor market in the regions of Slovakia

We evaluated the situation on the labor market in the regions of the Slovak Republic using the scoring method and the method of an evenly standardized variable. The results of the assessment of the level of the labor market determined by the scoring method are shown in Figure 6.

Figure 6: Results of the scoring method

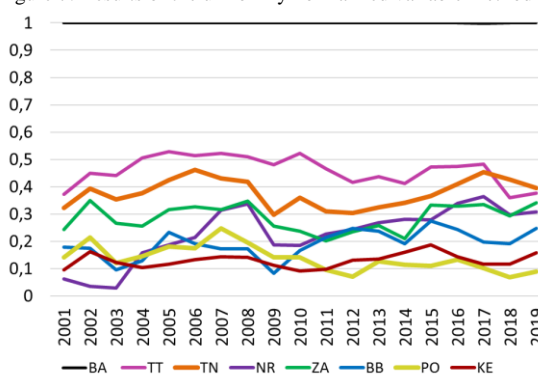


Source: own calculating.

The Bratislava region achieved the best rating in the entire monitored period, when, with the exception of 2017, it reached the maximum possible value of 100 points. The Trenčín region follows with a significant gap, in the years 2009-2011 the Trnava region.

The lowest score in the first three years was given to the Nitra region, in 2007 to the Banská Bystrica region, and in the last years to the Prešov region. Applying the method of a uniform standardized variable to assess the situation of the labor market in the regions of the Slovak Republic, we have reached the results shown in Figure 7.

Figure 7: Results of the uniformly normalized variable method



Source: own calculating.

The method of evenly normalized variable shows as significantly the best situation on the labor market in the Bratislava region. The second-best region in most years was Trnava region, while its score in only a few years exceeded 0.5. In the last two years, the second-best evaluation of the labor market has been achieved by the Trenčín region. The lowest rating by this method in 2001-2003 was in Nitra region, in the following years in Kosice region, in 2009 in Banská Bystrica region, in other years in Prešov region.

3.3 Comparison of the results of the scoring method and the method of a uniformly normalized variable

Based on the recalculations made in section 3.2, we can compare the final assessment of the labor market in the regions of the Slovak Republic found through both selected methods. We compare the evaluation in the first year of the observed period - 2001 (Tab. 2) and in the last year of the observed period - 2019 (Tab. 3).

Tab. 2: Evaluation of the labor market in the regions of the Slovak Republic in 2001

method	scoring method		uniformly normalized variable method	
	d_i	rank	Y_i	rank
BA	100	1.	1	1.
TT	67,43	3.	0,372	2.
TN	69,70	2.	0,322	3.
NR	61,43	8.	0,063	8.
ZA	65,26	4.	0,244	4.
BB	63,37	5.	0,179	5.
PO	62,73	6.	0,142	6.
KE	62,34	7.	0,096	7.

Source: own calculating.

In 2001, the results of the evaluation of the situation on the labor market by both methods were almost the same, the best region was the Bratislava region, the worst was the Nitra region. Based on the determination of the order of individual regions, only the difference in the location of the Trnava region and the Trenčín region is obvious.

Tab. 3: Evaluation of the labor market in the regions of the Slovak Republic in 2019

method	scoring method		uniformly normalized variable method	
	d_i	rank	Y_i	rank
BA	100	1.	1	1.
TT	70,76	3.	0,376	3.
TN	75,98	2.	0,395	2.
NR	69,10	5.	0,309	5.
ZA	70,32	4.	0,341	4.
BB	65,84	7.	0,247	6.
PO	62,05	8.	0,089	8.
KE	65,87	6.	0,158	7.

Source: own calculating.

Also in 2019, significantly the best values of integral indicators were recorded in the Bratislava region. Then Trenčín region and Trnava region. When comparing the evaluations by both methods, we find the same order of regions, with the exception of the Banská Bystrica region and the Košice region.

From our research, it is clear that in 2001 was the worst situation on the labor market in the Nitra region. During the period under review, he improved his position, and reached 5th place. On the contrary, the worst situation on the labor market in 2019 was in the regions of Prešov region, Košice region, Banská Bystrica region.

4 Conclusions

In our article, we focused on examining and evaluating the situation on the labor market in the regions of the Slovak Republic. We monitored the development of economic activity, employment, unemployment, average wage and the share of workers with tertiary education. These are factors that significantly affect the labor market in the regions of the Slovak Republic. The best results in economic activity were recorded in the Bratislava region and the worst results were achieved in 2007 in the Košice region, only 54.4%. The development of employment in the years 2001 to 2019 was fluctuating, but with an increasing tendency.

The highest employment rate in the Bratislava region is 77.1%, but in the last year (2019), the Trenčín region also exceeded 70%. The most significant increase in the employment rate in 2019 compared to 2001 was recorded in the Nitra region, up to 16.8 p.p. The development in terms of unemployment was positive.

In the first years, Slovak regions struggled with a very high unemployment rate (more than 20%). But the development of this indicator was positive until 2008, when due to the economic crisis, its value grew again. After 2013, its decline is recorded again, and in 2019, unemployment in all regions of Slovakia reached the lowest values of the entire period under review.

Another important indicator of the labor market is wages. Its average value in the observed period increased significantly in all regions of the Slovak Republic. Average wages in this period increased by an average of 198.8%. Employees in the Bratislava region achieve the highest wages. We must state that these wages significantly increase the average wages in the Slovak Republic, because the wages of employees in other regions are below the Slovak average.

The last monitored indicator was the share of employees with tertiary education. Even in this case, the values in the observed time series developed fluctuating, but with an increasing trend. In addition to the Bratislava region, the highest increase in the share of tertiary education was also recorded in the Košice region (by 18.3 pp) and the Banská Bystrica region (by 14.7 pp).

To evaluate the situation on the labor market, we used two methods: the scoring method and the method of a uniformly normalized variable. The scoring method is one of the simplest methods of multi-criteria evaluation and this simplicity is one of its great advantages. For this reason, it is widely used in the public sector. The standardized variable method is also a simple method; it is used more for evaluation based on quantitative criteria, in contrast to the scoring method, which is suitable for evaluation based on qualitative criteria.

We compared the results of both methods in 2001 and the Bratislava region was in the first place. In the scoring method, the Trenčín region came in second and the Trnava region came in third. In 2001, the other regions ranked equal in both methods. In 2019, the best region was again the Bratislava region in both examined methods. The change occurred in only two regions, but that year it was a weaker region. In the scoring method, the Košice region was ranked sixth and the Banská Bystrica region was ranked seventh. Using the standard variable method, the

order of the two regions was changed. The weakest region was the Nitra region in 2001 and the Prešov region in 2019.

The article deals with the development of labor market determinants in the regions of the Slovak Republic from 2001 to 2019 and their evaluation on the basis of two multicriteria methods. This is the period just before the outbreak of the Covid-19 pandemic, when the economy began to fall into depression. Against the background of the evaluation of development tendencies and problems of the economy, the shock was already seen, which caused a lot of changes. Unfortunately, due to the availability of statistics, we have not yet been able to capture the first data in regional statistics and analyze the effects of the pandemic on regional disparities. This period will be the subject of research activities in the following periods.

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