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The relationship between regional and national unemployment trends in Slovakia, 1991–1994[1]

ANTON BEZÁK[2]

In this paper an attempt is made to analyse the relationship between national and regional unemployment in Slovakia over the 1991–1994 period. Using an elementary statistical model based on a regressional framework involving a set of time regressions, three aspects of regional unemployment pattern are examined in some detail: (1) the relative importance of national factors in accounting for changes in regional unemployment, (2) the sensitivity of regional unemployment to changes in national unemployment, and (3) the extent to which a region leads or lags the whole country in its response to national unemployment fluctuations.

Data, regions and model

The data used in this study consist of monthly observations on the unemployment rates over the time period from September 1991 to December 1994 for all administrative districts and the whole country as well. In order to facilitate comparisons among districts, each of the two urban districts of Bratislava and Košice was combined with its rural counterpart into one metropolitan district, so that the number of regions (districts) used in the analysis was reduced to thirty-six. The 36 region system is shown in *Figure 1*.

The crude unemployment data were obtained from unpublished tabulations provided by the Ministry of Labour and Social Affairs. The unemployed in Slovakia are defined as persons who are resident in a given district, actively looking for work and who have registered at the appropriate district employment office. Persons out of work who do not register are not counted in the unemployment statistics.

The crude unemployment series were converted to unemployment rates using monthly estimates of the labour force for each region. The labour force estimates were obtained in the following way. First, annual estimates of population in the 15 and over age category by regions were extracted from the current registration of population. Annual estimates of the labour force were then computed by applying the labour force ratio which was derived from the 1991 census. These estimates were subsequently adjusted to ensure that the sum os the estimates for all regions in Slovakia is equal to the country estimate. Finally, the Lagrange interpolation formula was applied to the adjusted annual estimates of the labour force to obtain the labour force estimates on a monthly basis.

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[2] Institute of Geography, Slovak Academy of Sciences, Stefanikova 49. Bratislava, 81473 Slovakia

Figure 1. The 36 region system used for the analysis of the regional unemployment in Slovakia

36 régióból álló rendszer a szlovákiai regionális szintű munkanélküliség vizsgálatához

Before continuing, one important point should be emphasized. As the period under consideration is too short and the number of observation points is small, no sophisticated statistical methods developed for analysing the unemployment time-space series (BRECHLING, F. 1967; JEFFREY, D. and WEBB, D. J. 1972; KING, L. J. et al. 1972; KING, L. J. and CLARK, G. L. 1978; FROST, M. and SPENCE, N. 1981; FISCHER, M. M. and PETZ, G. 1988) will be applied in this paper. Instead some partial concepts and techniques will be presented and no attempts will be made to explain the results.

As noted in the introduction, the relation between the regional and national unemployment trends can be estimated by regressing rates in a given region (district) against national rates over time. The equation usually fitted has the form (JOHNSTON, R. J. 1979).

$$U_{it} = a_i + b_i\, U_{n,t+mi} + e_{it},$$

where: U_{it} is the regional unemployment rate in region i at time t, a_i, b_i are the regression coefficients, $U_{n,t+m_i}$ is the national unemployment rate at time $t + m_i$, where m_i is a lag term which may be either positive or negative, and e_{it} is the error term for region i at time t.

In order to determine the appropriate lead or lag, a series of regression equations with different values of m_i is run for each region. In each case the lead or lag yielding the highest level of explained variation in the regional rate is accepted as the best solution for the given region.

Two parameters of equation (1) describe the relationships between national and regional fluctuations in unemployment. The regression coefficient b_i provides a measure of the sensitivity of regional unemployment to changes in national unemployment. If $b_i > 1$, then the regional rate is assumed to be more sensitive to fluctuations than the national rate of unemployment. If $b_i < 1$, the reverse is the case. The m_i parameter reflects the extent to which a region leads or lags the whole country in its response to the national rate

fluctuations. Positive values of m_i indicate that the region lags behind the country, whereas negative values indicate a lead. In addition, the coefficient of determination r^2 measures the relative importance of national factors in accounting for changes in the regional level of unemployment over time. The larger the r^2 values the greater the importance of national factors as opposed to regional factors.

Empirical results

The model parameters in (1) were estimated for all regions using the ordinary least squares procedure with a series of different leading and lagging national unemployment rates in order to determine the lag parameter m_i. Five different regressions were run for each region series with values of $m_i = -2, -1, 0, +1, +2$. In each case the lead or lag yielding the highest level of explained variation in U_{it} (in terms of the coefficient of determination) was accepted as the best solution for the given region.

The r^2 values are mapped in *Figure 2*. As shown, two thirds of districts have r^2 values greater than 0.8 and only in the cases of five districts the values are below 0.5. This result implies that in the initial phase of unemployment occurrence in Slovakia, the fluctuations in regional unemployment level were strongly influenced by national factors. This is especially true of the districts of Dunajská Streda, Galanta, Košice, Levice, Liptovsky Mikulaš, Martin, Nové Zámky, Prešov, Prievidza, Senica and Žilina with extremly high values of r^2. On the other hand it is worth mentioning that in the metropolitan district of Bratislava only 8% of the fluctuations in unemployment level can be accounted for by the level of unemployment in Slovakia as a whole. Other districts where regional factors have an important role include Nitra ($r^2 = 0.28$), Banská Bystrica (0.42), Trnava (0.49) and Trencín (0.49).

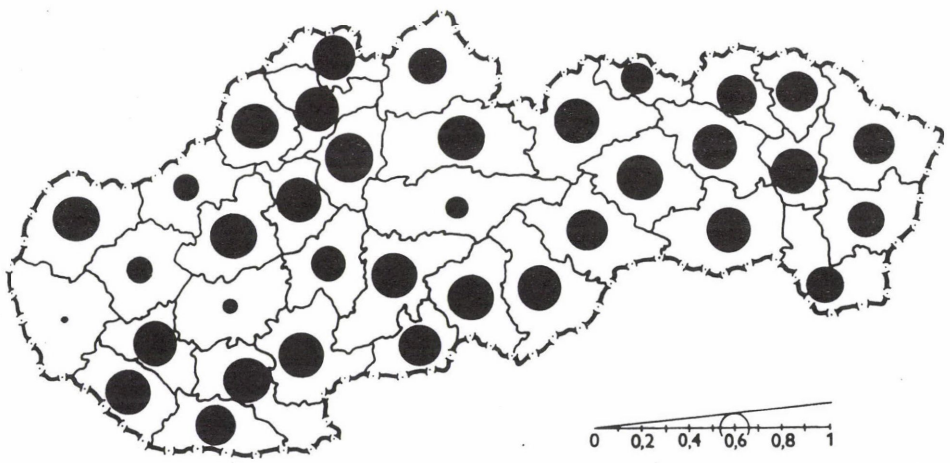

Figure 2. Regional differences in the relative importance of national factors (the r^2 values)

Regionális különbségek az országos hatótényezők relatív súlyának érvényesülésében (r^2 tényezők)

The b_i values indicating a region's sensitivity to national fluctuations are depicted in *Figure 3*. It is evident that the level of the sensitivity varies considerably among the regions. Furthermore, a distinct spatial pattern is apparent. The south–eastern regions stand out as being highly responsive to national changes in unemployment level, while the north–western regions are much less sensitive. High sensitivity to national fluctuations is a characteristic feature of the districts of Komárno, Nové Zámky, Velky Krtíš, Lucenec, Rimavská Sobota, Roznava, Spišská Nová Ves, Svidník, Vranov nad Toplou, and Michalovce. On the contrary, a very low level of sensitivity can be observed in the districts of Bratislava, Trnava and Trencín.

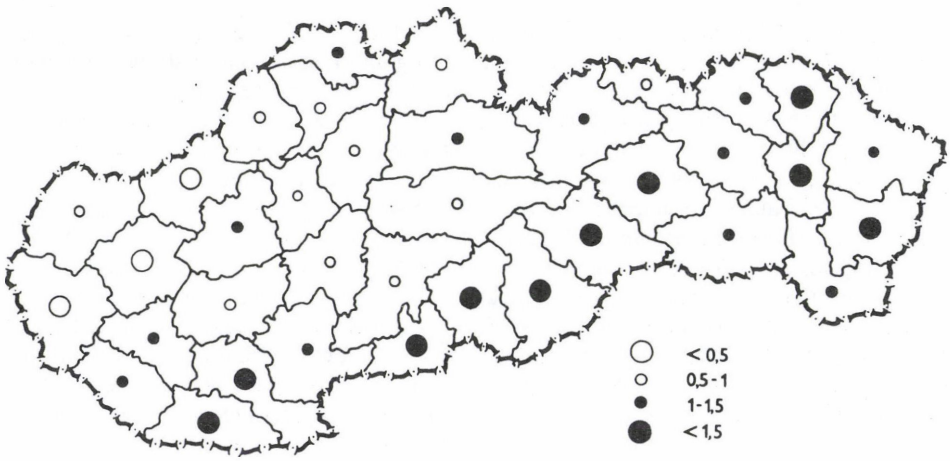

Figure 3. Regional differences in the sensitivity to national changes in unemployment level (the b_i values)
Regionális különbségek a munkanélküliség országos változására való érzékenységre vonatkozóan (b_i-értékek)

In interpreting the spatial distribution of the b_i values it should be emphasized that sensitive regions also tend to be the ones which experienced higher unemployment rates over the period under consideration. A strong association between the average unemployment level in a region and its sensitivity to the national trend can be demonstrated by the correlation coefficient of 0.77. This implies that the more prosperous regions with low average unemployment rates tend to be insensitive to national trends, while depressed regions with higher average unemployment rates are much more sensitive. The very low sensitivity of the metropolitan district of Bratislava is probably a result of its economic diversity cushioning the impact of national fluctuations. It is worth mentioning that a similar finding concerning Vienna was detected in an Austrian context (FISCHER, M. M. and PETZ, G. 1988).

No extended discussion of the time lags displayed in *Figure 4* seems warranted. The majority of the regions showed their strongest relationships with the national pattern when the two time series in question were unlagged. This does not imply, however, that these regions reacted at the same time to all national events. This finding simply indicates that the average tendency for a region to react early or late centred on zero for the majority of regions over the time period considered. Note that all the regions displaying lags behind

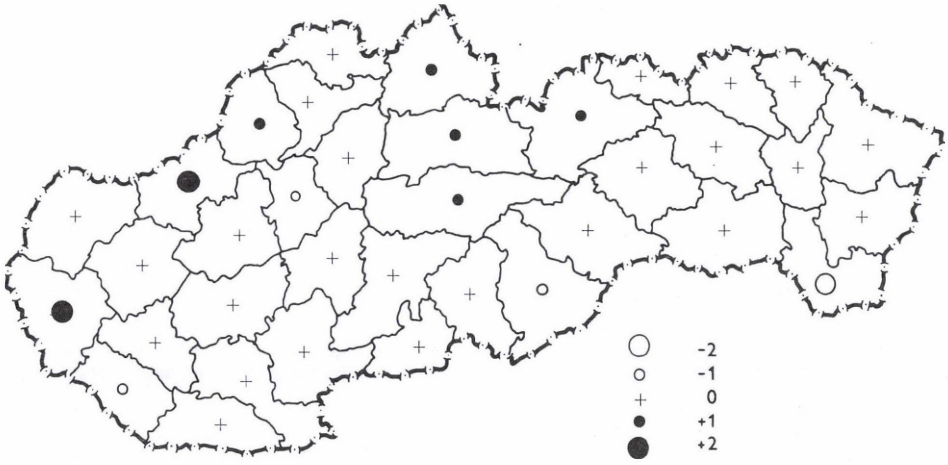

Figure 4. Regional differences in the time lags (the m_i values)

Regionális különbségek az időbeni lemaradás tekintetében (m_i-értékek)

the country are concentrated in the north–western part of Slovakia. In the case of Bratislava and Trencín the lag is two months, whereas the remaining regions follow the country with a one month lag. On the contrary, the districts of Dunajská Streda, Prievidza, Rimavská Sobota and Trebišov tend to lead the country by one or two months.

Conclusion

The main conclusions from the results obtained in this study can be summarized as follows. First, it is evident that the national effect in accounting for changes in regional unemployment is strong and felt in almost all regions. Second, there are sharp differences among regions in their sensitivity to national changes resulting in a clear spatial pattern. The south–eastern regions stand out as being highly responsive to national changes in unemployment level, while the north–western regions are much less sensitive. Third, there is a strong relationship between the mean unemployment rate in a region and its sensitivity to the national trend. Fourth, the majority of regions display no lead or lag in their response to national unemployment fluctuations.

Finally, it is worthwile to mention that the most importan deviation from these generalizations is a group of regions comprising the districts of Bratislava, Trnava, Trencín, Nitra and Banská Bystrica. These regions are weakly influenced by national factors, much less sensitive to national changes in unemployment level and (except the districts of Trnava and Nitra) tend to lag behind the country in their response to national unemployment fluctuations.

REGIONÁLIS ÉS ORSZÁGOS MUNKANÉLKÜLISÉGI TRENDEK VISZONYA SZLOVÁKIÁBAN, 1991–1994.

A. Bezák

Összefoglaló

A tanulmány a szlovákiai országos és regionális munkanélküliség kapcsolatának elemzésével foglalkozik egy négy esztendős időszakra vonatkozóan. A felhasznált adatbázis az egész országra, ill. a 36 régióra 1991 szeptemberétől 1994 decemberéig rendelkezésre álló munkanélküliségi statisztikára támaszkodik. Az elemi statisztikai modell regressziós jellegű; a kapcsolat felderítésére az időbeni regressziós sorozat szolgál.

A vizsgálati eredményekből a következő tanulságok szűrhetők le. Először, az országos trend az összes régióban érezteti hatását. Másodszor, a régiók közötti, az országos hatásokra megnyilvánuló érzékenységben mutatkozó éles különbségek határozott térbeli képet mutatnak. A délkeleti országrész reagál a legélénkebben a munkanélküliségi szint országos változására, míg az északnyugati területek erre sokkal kevésbé érzékenyek. Harmadszor, egy adott régió átlagos munkanélküliségi rátája és az országos értékhez viszonyított érzékenysége között erős a kölcsönkapcsolat. Negyedszer, a régiók többsége nem mutat kiugró (pozitív vagy negatív) eltéréseket az országos munkanélküliség ingadozására történő reakciójában.

Végül éredemes utalni arra, hogy fenti általános tendenciák alól kivételt képeznek a pozsonyi, nagyszombati, trencséni, nyitrai és besztercebányai körzetek, amelyeket az országos munkanélküliségi szintek kevéssé befolyásolnak, és amelyek (a nagyszombati és a nyitrai körzet kivételével) az országos munkanélküliségi ráta ingadozására csupán kevéssé reagálnak.

Fordította: BASSA L.

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